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Department of Infectious Diseases

CLINICAL PARASITOLOGY AND TROPICAL MEDICINE. PARASITOSES

MANUAL

for independent work

for students of the 6th years

Specialty 222 «Medicine»

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Introduction

Knowledge of parasitic and tropical diseases, understanding of the patterns of their development and course, and the ability to apply them in diagnosis, differential diagnosis and treatment are required for doctors of all specialties. The causative agents of some parasitoses are potential biological threat factors, and a number of parasitic diseases are associated with HIV infection. The most common pathological manifestation of parasitoses is immunosuppression. As a result, parasitoses can contribute to the frequent occurrence of other infectious diseases and non-infectious pathological conditions.

The discipline "Clinical Parasitology and Tropical Medicine. Parasitoses" is studied as a separate course in parallel with the course "Infectious Diseases" by students of the School of Medicine. This is due to several reasons, namely the increase in migration processes in the world and the spread of endemic and tropical diseases, as well as to meet the requirements of the Bologna Protocol, which provides for the recognition of a medical diploma in European countries after a future doctor has completed this specialised course.

The absence of a textbook on clinical parasitology and tropical medicine for medical students has led to the creation of a textbook. The present textbook is compiled in accordance with the curriculum of the discipline and is intended to fill the existing gap in medical education and in the field of clinical parasitology.

The manual is presented in separate chapters that address issues related to parasitic and tropical diseases, principles of diagnosis, treatment and prevention. The material provided in the textbook is based on modern scientific concepts with the use of the latest diagnostic and treatment methods. In writing the chapters, special attention is paid to the early and pathognomonic symptoms of parasitic and tropical diseases, the basic criteria for the clinical diagnosis of each nosological form of the disease, and epidemiological features.

This manual is compiled in accordance with the curriculum for the discipline for 6th year students of «Master» of Medicine, professional qualification " Physician".

I. CLINICAL PARASITOLOGY AND TROPICAL MEDICINE. PARASITOSES

Peculiarities of infectious diseases in countries with tropical climates. Diseases of travellers

TRAVELLER'S DIARRHOEA is the most common and most unfavourable health condition for travellers. The illness can be quite long, painful and debilitating. According to the CDC, the US Centre for Disease Control, 20% to 50% of international tourists (about 10 million people) suffer from traveller's diarrhoea in the first week of their trip, but the disease can develop throughout the entire period of stay in certain countries and even after returning home. A significant proportion of traveller's disease cases occur in Latin America, Africa, the Middle East and Asia. The high-risk group for this disease includes young and elderly people, people with weakened immune systems, chronic inflammatory diseases of the gastrointestinal tract, or diabetes, as well as tourists taking antacids or H2 blockers. Currently, the main cause of traveller's diarrhoea is infectious agents, the most common pathogen being enterotoxigenic Escherichia coli and other pathogens belonging to a new group of pathogenic bacteria - superbugs. In industrialised countries, the causative agent of acute diarrhoeal disease is usually a virus, and sometimes Clostridium difficile in patients who have taken antimicrobials. Diarrhoea in travellers ("traveller's diarrhoea") returning from a country with poor hygiene is usually caused by a bacterium, rarely a virus or parasite. Approximately one third of travellers are found to have more than one type of pathogenic bacteria.

Etiology and epidemiology. The period of global changes taking place on Earth (climatic, migration, technical and other) requires new approaches to assessing medical risks that any person may face One of these areas of medical development is travel medicine, which has recently become widespread and defined against the background of a significant number of people (about 2 billion)

who make various trips every year for tourism, humanitarian missions, globalisation of production or migration of large segments of the population as a result of wars and search for work and safe places to live.

Traveller's diarrhoea is characterised by more frequent stools than usual for the individual, or by loose or watery stools within 24 hours (WHO). The source of contamination in most cases is food or drink contaminated with faeces. The regions with the highest risk of traveller's diarrhoea are: South Asia (60-80%), sub-Saharan Africa, most of Central and South America (20-60%). Caribbean islands, northern and southern Africa, and Eastern Europe (8-20%). The factors that influence the risk of contracting a gastrointestinal infection are: characteristics of the microorganism (pathogenicity, infectious dose, etc.); characteristics of the host (genome, immune defence, stomach acidity, etc.). Etiology of traveller's disease: bacterial etiology (50-80% - EACP, EPCP, ETCP, Campylobacter, Salmonella, Shigella; viral etiology (5-25% - rotavirus, norovirus, adenovirus, hepatitis A virus; parasitic etiology (<10% - giardiasis, amoebiasis, cryptosporidiosis, cyclosporiasis.

Clinical picture: usually begins during the first week of travel. The average duration is 3-5 days; in 2-3% of cases, the duration of the disease exceeds 2 weeks, in 1-2%, the duration exceeds one month.

Traveller's diarrhoea is mild to moderate in more than 90% of cases and resolves without intervention; less than 1% of cases require hospitalisation. Symptoms: abdominal pain, nausea, fever, muscle pain. Invasive bacteria cause an illness that is often more severe than that caused by non-invasive bacteria (e.g. salmonella septicaemia). Cryptosporidium can cause profuse watery diarrhoea that lasts for several weeks. Amoebiasis is often characterised by bloody diarrhoea and can be severe. Severe disease can lead to dehydration and acidosis. Complications: reactive arthritis (salmonellosis, shigellosis and campylobacter infections), Guillain-Barré syndrome (campylobacteriosis), haemolytic uremic syndrome (HUS). Acute diarrhoeal disorders of travellers.

The standard test is performed by one of the following methods: bacteriological examination of a stool sample - the pathogen is detected in only

about 15% of cases; a combination of a nucleic acid detection test based on gene amplification and stool culture; detects the pathogen in almost 80% of cases. Both tests can detect Salmonella, Shigella, Yersinia and Campylobacter. The nucleic acid test can also detect the cholera vibrio Vibrio cholerae, as well as strains of Escherichia coli that cause diarrhoea: EACP, ECCP, EICP, EICP, EHICP. The nucleic acid detection test is more sensitive and faster than bacterial culture. Specimens positive for Salmonella, Shigella, Yersinia, Campylobacter or EGCP. In the nucleic acid detection test, the pathogen culture is additionally examined and, if necessary, antibiotic sensitivity is determined (without a separate referral). Other tests for acute illness are determined according to the symptom picture

Differential diagnosis of leishmaniasis. Differential diagnosis of trypanosomiasis. Problems of malaria. Complicated forms of malaria. Treatment of malaria caused by resistant strains of pathogens. Modern prevention

LEISHMANIASIS is a group of protozoan infections characterised by skin lesions (cutaneous leishmaniasis) or predominantly internal organ damage with fever, splenomegaly and anaemia (visceral leishmaniasis).

Etiology and epidemiology. Leishmania are intracellular parasites that develop in macrophages by simple halving. The causative agent is Leishmania donovani, which has four subspecies - L.d. donovani (Indian variant), L.d. infantum (Mediterranean-Central Asian variant), L.d. archibaldi (East African variant), L.d. chagasi (South American variant). Mediterranean-Central Asian visceral leishmaniasis and East African visceral leishmaniasis are zoonoses. The main source of infection is wild (jackals) and domestic (dogs) animals. The infection is transmitted through mosquito bites. Indian visceral leishmaniasis is an anthroponosis. The main source of infection is humans. The mode of transmission is vector-borne, through mosquito bites. In visceral leishmaniasis, the pathogen enters the body after a mosquito bite and multiplies in macrophage cells of the spleen, liver, bone marrow, lymph nodes, intestinal wall, kidneys, lungs, and is characterised by hyperplasia of the lymphohistiocytic system.

Clinic. It is characterised by three periods: initial, anaemic-splenomegalic, and cachectic (terminal). The incubation period is from 15-20 days to 10-12 months. After the onset of the primary affect (a pale pink slightly pigmented nodule appears at the bite site), the patient develops fever, lethargy, adynamia, pale skin, decreased appetite, and a slight enlargement of the spleen after the incubation period.

In the period of full development of the disease - remitting fever, or temperature in the form of a Rodener curve, severe splenomegaly. The spleen is enlarged, sometimes reaching the pubic junction, anaemia, and enlarged peripheral

lymph nodes. In the blood, there is a sharp leukopenia up to $2*10^9$ /l, lymphocytosis, granulocytopenia, anaemia, thrombocytopenia. The acute period is followed by the cachectic period - severe splenomegaly, general weakness, decreased muscle tone, thinning of the skin on the abdomen, so it seems that the spleen is sagging downwards and the abdomen is protruding. Patients have leishmaniasis in the form of nodules the size of a urea nucleus and skin areas with reduced pigmentation. Patients develop complications in the form of pneumonia, necrotising stomatitis, gingivitis, noma, and abscesses.

Diagnosis - bone marrow puncture, liver and spleen biopsy. Serological methods - PCR, ELISA, PCR.

Treatment: pentostat, glucantim (antimony), meglumine antimonate, sodium stibogluconate, amphotericin B, spleen removal. In case of cutaneous forms of leishmaniasis, in addition to the above-mentioned drugs, treatment of the initial stages of ulcers is carried out with laser therapy and cryotherapy.

CUTANEOUS LEISHMANIASIS is divided into Ancient World leishmaniasis and American cutaneous leishmaniasis. Cutaneous leishmaniasis of the Ancient World is widespread: the Mediterranean, the Middle East, West and Central Asia, Africa.

Etiology and epidemiology. The causative agent of anthroponotic cutaneous leishmaniasis is Leishmania tropica (minor), and zoonotic leishmaniasis is Leishmania tropica (major). Rural cutaneous leishmaniasis is a zoonotic disease. The source of infection is steppe rodents, wolves, jackals. Transmission occurs through mosquito bites. A person becomes infected when he or she enters the centre of a suspected disease. After returning to the city, a person becomes the main source of infection. Urban leishmaniasis (anthroponosis). In cutaneous leishmaniasis, the pathogen spreads and causes local skin lesions in the form of the following stages: proliferation, destruction (ulceration), and repair (scarring). Leishmania can enter regional lymph nodes from primary lesions.

Clinic. The incubation period is 2-9 months (sometimes 3-5 years). The disease begins with the appearance of papules that slightly rise above the skin of

red-brown colour. After 3-6 months, an ulcer in the form of a crater-like pit forms at the site of the papule, its bottom is fine-grained, covered with purulent layers. Around the ulcer there is a moist infiltrate, the edges of the ulcer are unevenly eaten away, the discharge is slight, seropurulent, and the ulcer dries up with the formation of a brown crust. The duration of the primary lesion - from the appearance of the papule to ulcer scarring - is approximately one year.

Zoonotic leishmaniasis is characterised by a shorter incubation period - up to 3-4 weeks. The progression of the disease is faster. Several ulcers are often formed. Ulcers can reach 10-15 cm and leave large scars. In Africa, zoonotic cutaneous leishmaniasis can take on a lepromatous form.

The **diagnosis** of cutaneous leishmaniasis is confirmed by scraping the contents of the ulcer with Romanowski-Gimza staining. It is important to know how to take a scraping properly. It is necessary to take the ulcer area with tweezers so that it is anaemic. after the incision, a thin layer of tissue is removed with a scalpel.

AMERICAN SKIN LEISHMANIASIS, a large number of pathogens and their names depend on the country in which they are registered. For example, L.mexicana, L.braziliens, L.peruviana, etc. The pathogenesis and clinic are almost the same as cutaneous leishmaniasis of the Old World, with the exception of chakler's ulcer, which occurs with cartilage damage to the ears, cutaneous mucosal leishmaniasis (espundia), with damage to the cartilage of the nasopharynx, larynx, and trachea.

The diagnosis is made on the basis of clinical manifestations and a positive Montenegro test (intradermal leishmanin test).

Trypanosomiases are a group of vector-borne protozoan diseases caused by haemoflagellates of the genus Trypanosoma.

AFRICAN TRYPANOMONIASIS (sleeping sickness**)**. The disease is characterised by irregular fever, exanthema, swollen lymph nodes, local edema, and drowsiness. There is an acute course - Rhodesian, and a course with a

tendency to chronicity - Gambian type of the disease. The disease is distributed exclusively in tropical Africa.

Etiology. Trypanosoma brucei gambiense - Gambian sleeping sickness, Trypanosoma brucei rhodesiense - Rhodesian sleeping sickness. T.gambiense - anthroponosis. The carrier is the tsetse fly. Trypomastigotes enter the fly's stomach with the blood of a sick person. They turn into epimastigotes in the body of the vector, then enter the blood of a healthy person, lymph nodes, and cerebrospinal fluid in metacyclic forms. As a result, the reticulo-endothelial system, kidneys, spleen, liver, and later the soft membranes of the brain, midbrain and medulla are affected, and panencephalitis develops.

There are 2 periods in the clinic. In the first stage, after an incubation period lasting from 2 weeks to several months, a primary trypanosomiasis chancre develops, with generalisation of the process later. During this period, the following symptoms develop: irregular fever, erythematous rashes (trypanidae), lymphadenopathy, headache, tachycardia, hepatosplenomegaly, insomnia, hyperesthesia, anaemia, progressive weakness, mental and physical fatigue. In the second stage of the disease, drowsiness progresses in the morning and during the day. At night, sleep is restless and intermittent. The patient can barely drag his/her feet, is gloomy, the lower lip sags, salivation develops, and limb tremors.

Drowsiness progresses to falling asleep during meals. Meningeal signs, coma, cachexia, and ICE syndrome develop.

Rhodesian trypanosomiasis is a fast-moving disease. Death usually occurs 3-9 months after infection. The diagnosis is confirmed by a puncture of the chancre, lymph nodes, bone marrow; lumbar puncture. Smears are stained using the Romanowski-Gimza method, the crushed drop method, RHC, ELISA, and PCR.

Treatment of African trypanosomiasis. Without CNS involvement: Suramin 20 mg/kg IV on days 1, 3, 7, 14 and 21. Pentamidine 4 mg/kg IV once daily for 10 days. With CNS damage: melarsoprol 2.2 mg/kg once daily for 10 days.

AMERICAN TRYPANOSOMIASIS (Chagas disease) is common in South and Central America.

The causative agent of Tripanosoma cruzi Chagas. Zoonosis. Carriers are "kissing bugs". Bedbugs attack a person who is sleeping at night, biting him or her near the eyes or on the lips. When sucking blood, the bug defecates. With the excrement, trypanosomes enter the human body. The reservoir of the pathogen in nature is armadillos, monkeys, opossums, anteaters, and bats.

The clinic is caused by the dissemination of the pathogen through the bloodstream, destruction of ganglion and nerve cells, damage to the heart, nervous system, digestive and respiratory systems. The disease begins 1-3 weeks after the bite, with malaise, chills, fever, headache, muscle pain, and hepatosplenomegaly. The primary reaction, shagoma, occurs at the bite site. A characteristic sign of the disease is an increase in lymph nodes, swelling on the face, thighs, dorsal surface of the feet, and fever of a permanent or remitting type. Leukocytosis with monocytosis develops in the blood; on the part of the heart, there is an expansion of the boundaries, sometimes pericardial effusion, a "galloping" rhythm, ventricular extrasystoles are detected. Patients die most often from the development of cardiovascular failure. In the case of a favourable course, after 4-5 weeks, the patient's condition improves, the temperature normalises and trypanosomes disappear from the peripheral blood. The disease progresses to the chronic stage, which is characterised by heart damage (cardiomyopathy). The development of a blockade of the right atrioventricular bundle is characteristic.

Diagnosis: thick drop and blood smear with Romanowsky-Gimsey staining, intraperitoneal infection of mice or pigs, haemoculture, RBC, Machado-Gueireiro reaction, ELISA.

Treatment. Benznidazole 5-8 mg/kg orally in two doses, 60 days; nitrofurtimox 2-2.5 mg/kg orally 2 times a day for 90 days.

TRYPANOSOMIASIS. These are tropical vector-borne infections, the causative agents of which belong to the Sarcomastigophora type, Mastigophora

subtype, Epomastigophora class, Kinetoplastida order, Trypanosomatina suborder, Trypanosoma genus.

The developmental cycle takes place with a change of hosts. Part of the cycle takes place in vertebrate hosts (humans, animals), and the other part in invertebrate hosts, insects. The diseases are common in tropical Africa (African trypanosomiasis, or sleeping sickness) and South America (American trypanosomiasis, or Chagas disease).

The causative agents of African trypanosomiasis go through two stages of development: the trypomastigote and epimastigote stages. Two more stages have been described for the causative agent of American trypanosomiasis: the promastigote and amastigote stages.

African trypanosomiasis

Trypanosomes go through two stages of development: trypomastigotes (in the human body) and epimastigotes (in the tsetse fly).

It is known in two varieties:

- Gambian (West African)
- Rhodesian (East African)

	African trypanosomiasis		**American trypanosomiasis**
	Gambian	**Rhodesian**	
Pathogen	Trypanosoma brucei gambiens	Trypanosoma brucei rhodesiense	Trypanosoma cruzi Chagas
Region of distribution	West and Central Africa	Central and Eastern Africa	All countries of South America (most of all in Brazil, Argentina, Venezuela)
Reservoir	Human (possibly pigs)	Antelopes, to a lesser extent cattle	In anthropurgic foci, there are sick people and carriers

			in natural foci - about 100 species of vertebrates
Vector	The tsetse fly	The tsetse fly	Fleas of the genus Triatoma
Mechanisms and routes of transmission	Transmission	Transmission	Contact (rubbing in the wound from sucking flea faeces), haemotransfusion, vertical - in childbirth, the transplacental route is being studied
Incubation period	2-3 weeks	1-2 weeks	1-2 weeks
Primary affect	Trypanosomiasis chancre	Trypanosomiasis chancre	Chagoma
Fever	wavy	wavelike higher and longer-lasting fever	Sowing or remitting with possible chills, sweating
Rash	Trypanids	Trypanids	Small-spotted
Lymphadenitis	++	+	+
Hepatosplenomegaly	+	+	+
Progressive disaster damage	meningoencephalitis	The signs of meningoencephalitis appear faster and are more severe.	The autonomic nervous system is often deeply affected (serious damage to the myocardium, stomach, intestines). Meningoencephalitis is common.
Course.	More benign	Rarely lasts more than a year	
Cause of death	Meningoencephalitis, myocarditis, bacterial infections	Meningoencephalitis, myocarditis, bacterial infections	in the acute stage - meningoencephalitis; in the chronic stage -

			heart failure, thromboembolism.
Chemoprophylaxis	Pentamidine 3-4 mg/kg once every 6 months	Inefficient	Not applicable

Trypanosomes multiply at the site of tsetse fly suction, in the skin. They penetrate the lymphatic vessels and enter the lymph nodes. After 2-3 weeks, they are hematogenously distributed to parenchymal organs, where they cause inflammatory and autoimmune processes. Trypanosomes are able to modify their antigenic structure during the infectious process and thus escape the influence of immune surveillance factors. The infectious process is long due to the wave-like nature of parasitemia, which stops as a result of the synthesis of a sufficient level of specific antibodies and resumes when a new antigenic variant of the pathogen is formed.

The small vessels of the heart and the NS are affected, which leads to inflammatory and degenerative changes (myocarditis, meningitis, demyelinating panencephalitis).

Clinic

Stages of the disease:

- early (haemolymphatic)
- late (meningoencephalitis).

The primary lesion is a 2 cm papule (trypanosomiasis chancre) that disappears in a few days, leaving a scar. Shortly afterwards, there is a wave-like fever of 38-39 °C, which lasts for weeks with short periods of apyrexia. A rash in the form of trypanids is characteristic - erythema in the form of plaques and rings 5-15 cm in size (more often on the skin of the back, chest, face) and lymphadenitis (of the peripheral lymph nodes, less often mesenteric, peribronchial). Hepatosplenomegaly.

If left untreated, it progresses to the late stage in 3-10 months. Gradually, a picture of progressive meningoencephalitis develops (fatigue, apathy, lethargy,

daytime sleepiness and restlessness at night, followed by the development of fibrillary muscle twitching, convulsions, paresis and paralysis with the development of lethargy and cachexia in the terminal stage). The immediate cause of death is bacterial infections, in the acute period - meningoencephalitis and myocarditis.

In Europeans, unlike the local population, the disease is much more severe.

American trypanosomiasis

Trypanosomes go through four stages of development: promastigotes, amastigotes, tripomastigotes and epimastigotes.

Trypanosomes enter the regional lymph nodes through the skin or mucous membranes (most often the conjunctiva) and multiply reactive. Then there is a progressive damage to the autonomic nervous system (ANS), resulting in impaired inertia of internal organs, primarily the heart, stomach, small and large intestine.

Clinic:

Stages of the disease:

- sharp
- chronic inapparatus
- chronic manifesto.

At the site of penetration, the primary effect (chagoma) occurs - a dark red, limited skin induration with edema, lymphangitis and regional lymphadenitis, which can last up to 2 months with gradual regression. In case of contact with the conjunctiva, acute inflammation with severe edema develops, which can spread to the temporal region and face (Romany's symptom) with the development of inflammation of the regional parotid lymph nodes.

After 1-2 months, the infectious process is generalised, which is manifested by a rise in temperature to 39-40 °C, which is constant or remitting with possible chills and sweating. The temperature can be maintained for up to 2 months. During this period, the liver and spleen become enlarged, and a small spotted rash may appear on the skin, which disappears on its own in 1-3 weeks. Symptoms of heart

damage are constant (weakening of the tones, systolic murmur, expansion of the heart's borders, weakening of the pulse and a decrease in systolic pressure, in severe cases arrhythmia, heart failure, which is often the cause of death). A significant proportion of patients develop meningoencephalitis with possible paresis and paralysis.

With a favourable course, clinical symptoms gradually regress.

The chronic inaparanthous stage develops after the acute stage. Non-sterile immunity is formed. There are no clinical symptoms.

The chronic manifest stage is characterised by the progression of internal organ damage due to autoimmune processes. Clinically, it is most often manifested by cardiovascular lesions or meningoencephalitis (severe myocarditis and rhythm disturbances, cardiac dilatation). The most common causes of death are heart failure and thromboembolism. A characteristic feature of meningoencephalitis is damage to the autonomic ganglia, which is manifested by atonic dilation of internal organs (esophagus, stomach, colon, bladder) due to inertia disorders. Paresis and paralysis may develop. Secondary bacterial complications (pneumonia, pyelonephritis, etc.) may occur.

Specific diagnosis of trypanosomiasis:

1. Microscopic method - a thick drop and a smear of blood, liquor, chancre puncture, lymph nodes, bone marrow.
2. For the detection of Trypanosoma gambiens, blood concentration techniques are used (microhematocrit centrifugation, leukocyte film technique, anion exchange chromatography technique in mini-columns followed by centrifugation).
3. Serological tests (PCR, ELISA).
4. Biological test on guinea pigs.
5. Skin allergy tests.

Differential diagnosis of trypanosomiasis:

- malaria
- visceral leishmaniasis

- meningoencephalitis
- tuberculosis
- brucellosis
- myocarditis.

Treatment of trypanosomiasis:

All patients need inpatient treatment, bed rest, and vitaminised nutrition.

Etiotropic treatment:

- African trypanosomiasis: at an early stage, IV suramin, eflornithine, IV pentamidine. The course of treatment is 3-4 weeks. In the late stage, nitrofuran drugs or benznidazole + nifurtimox are added to the above therapy. Severe cases and relapses: melarsoprol + prednisolone.
- American trypanosomiasis: therapy is less effective; benznidazole is administered orally at 5-10 (7.5) mg/kg/day in 2 doses for 60 days; nifurtimox is administered orally at 8-10 mg/kg/day in 3 doses for 60-90 days. Treatment of chronic forms gives worse results.

Pathogenetic and symptomatic therapy:

Detoxification therapy, antiplatelet agents, CS, if indicated.

A positive clinical effect in the treatment of African trypanosomiasis was obtained by combining antimicrobials and γ-IFN.

Dispensary observation for 2 years.

Prevention:

Early detection and treatment of patients, disinfestation, sanitary and educational work. Control in the selection of donors in endemic areas.

Chemoprophylaxis.

MALARIA is a group of endemic vector-borne diseases of protozoan etiology. It is characterised by recurrent fever, anaemia, and hepatosplenomegaly.

According to the WHO, malaria is currently the most common parasitic disease, with a large number of severe forms and a high mortality rate. The overall incidence of malaria is 2.6% of all diseases in the world. The death toll from

malaria ranges from 1.5 million people annually, with 85% of this figure being malaria deaths in Africa. In terms of percentage, malaria deaths reach 4-5% of total global mortality.

Malarial coma can develop in the first days of tropical malaria. There are three stages: somnolence (precoma), soporas - deeper hibernation with weak gaps in consciousness and deep coma with complete loss of consciousness. During the precoma period, patients are inactive, monosyllabic and reluctant to answer questions, quickly become exhausted and fall into a soporic state. Many patients have positive meningeal signs. They are caused not only by cerebral hypertension, but are also associated with damage to the tonic centres in the frontal area. In some patients, hyperkinesis phenomena are noted, ranging from clonic limb muscle cramps to general tonic cramps. Abdominal reflexes are reduced, and oculomotor disorders appear: divergent strabismus, nystagmus (horizontal and vertical), and convergence disorders. In coma, the pharyngeal reflex disappears, followed by the corneal and pupillary reflexes. There are floating movements of the eyeballs with the eyelids open (as if the patient is looking at the ceiling). Temperature is 39-40°C, blood pressure is below 70/30 mmHg, heart sounds are deaf, heart borders are dilated, pulse is threadlike, tachycardia (130-150 per minute), breathing is shallow, rapid from 30 to 50 per minute. There is involuntary urination and defecation. Laboratory examination reveals: a high level of parasitemia - 100000 in 1 μl of blood; different age stages of the parasite in the peripheral blood; hematocrit below 20%, hemoglobin below 50 g / l; increased creatinine, blood urea; blood glucose less than 2.2 mmol / l; acidosis - arterial blood pH below 7.25, alkaline reserve less than 15 μmol / l. With each hour of the patient's stay in a coma, the possibility of saving him decreases. The success of therapy in patients with malarial coma can be achieved only in the first two, at most three days. Long-term consequences of cerebral malaria are observed in 5-10% of patients. The most severe consequences include: hemiplegia, ataxia, extrapyramidal disorders, mono- and polyneuritis, postmalarial psychosis, characterised by mental weakness, hysteria, and depression.

In addition to malarial coma, tropical malaria can develop acute pulmonary oedema, which is more often the result of acute renal failure. However, there is a rare, especially malignant complication of tropical malaria - primary pulmonary edema, which sometimes develops even at normal temperature. Patients suddenly develop severe dyspnoea of 50-60 per minute, cyanosis, acrocyanosis. This complication is almost not amenable to conventional intensive care.

Haemoglobinuric fever can be of parasitic or drug origin (sometimes called quinine-malarial haemoglobinuria), so it requires different treatment. Hemoglobinuric fever is characterised by massive red blood cell breakdown, when their number decreases to $1x\ 10^{12}$ / l in a few hours, hemoglobin decreases sharply to 13 g / l, reticulocytosis appears (up to 33% of normoblasts) with the development of severe haemolytic jaundice and haemoglobinuria. Hemoglobinuric fever often occurs several hours after taking quinine, primaquine or other drugs that have an oxidative effect and promote haemolysis. It occurs mainly in people with a deficiency of the red blood cell protective enzyme glucose-6-phosphate dehydrogenase.

Hemoglobinuric fever begins suddenly with chills. The temperature reaches 40 °C, intense pain in the kidneys, headache, severe weakness, nausea, and vomiting appear. Hemolysis is accompanied by the development of jaundice, the appearance of urine of the colour of "black coffee" or "red wine" with a characteristic sediment in the form of cylinders, red blood cells, and protein. The main symptom is the appearance of "black coffee" coloured urine, which is due to the content of oxyhaemoglobin in the urine (meta-haemoglobin in the settled urine). When standing, the urine is divided into 2 layers: the upper one is transparent dark red, the lower one is cloudy dark brown, containing detritus (lumps of haemoglobin and red blood cells). Oliguria and anuria follow. There are few parasites in the peripheral blood in drug-induced haemoglobinuric fever.

In some countries (Indonesia, Brazil), chloroquine-resistant pathogens of three-day malaria have been identified. In such cases, amodiaquine 30 mg/kg per day for 3 days is used.

Vivax and ovale malaria are characterised by late relapses due to the preservation of bradysporozoites in hepatocytes. This requires the administration of histoschizotropic drugs that act on the tissue forms of the parasite - primaquine 15 mg (3 tablets) once daily for 14 days.

For the treatment of chignamine-resistant tropical malaria (parasitemia++ in 1 μl of blood), one of the combinations is used orally:

- artesunate + amodiaquine, 2 tablets per day for 3 days orally;
- artesunate + mefloquine, 1 tablet for 3 days orally;
- metacalfin, 1 tablet for 3 consecutive days orally;
- Fansidar 3 tablets orally at the same time.

In severe tropical malaria (parasitemia +++ in 1 μl of blood), it is used:

- artesunate - water-soluble artemisin derivatives at a dose of 2 mg/kg once a day + clindamycin 10 mg/kg twice a day for 7 days;

-Artemether 3.2 mg/kg intramuscularly (oil solution) - on the first day, from day 2 to day 5 1.6 mg/kg intramuscularly.

- quinine 10 mg/kg every 12 hours (but not more than 2 grams per day) intravenously drip + doxycycline 5 mg/kg once a day for 7 days.

In case of malarial coma, quinine is the drug of choice, as it is the best able to penetrate the blood-brain barrier. Quinine is a natural alkaloid of the quinine tree bark. Therapy begins with intravenous administration of quinine at a single dose of 10 mg/kg body weight every 12 hours. Dilute 1 ampoule (1 ml of 50% quinine solution) in 500 ml of isotonic sodium chloride solution or 5% glucose solution (with low blood pressure in polyglucose) and administer at a rate of no more than 20 drops per minute. A dose of 0.02 mg/kg/min is maintained for 72 hours using an infusion pump. As soon as the patient recovers from a serious condition, they switch to oral administration of the drug. When quinine alone is prescribed, the relapse rate remains high, so one of the following drugs is prescribed simultaneously with quinine: artemether, clindamycin, doxycycline, and others. For example, the combined drug fancidar is administered intramuscularly 2.5 ml

once daily for the first 3 days. This drug should be injected deep into the muscle; it should not be added to infusion solutions.

Prevention. Preventive measures are aimed at:

- timely detection and treatment of malaria patients and parasite carriers;
- vector control and protection against mosquito bites;
- chemoprophylaxis.

They are subject to a malaria test (a thick drop and a blood smear):

- all patients with fever with an undiagnosed diagnosis within 5 days, with enlarged liver and spleen, anaemia, especially if they have travelled to malaria-endemic countries in the last 3 years;
- blood recipients with fever within the next three months after a blood transfusion.

People who have returned from malaria-endemic countries cannot be donors for 3 years.

The most important condition for combating malaria is the implementation of hydraulic engineering measures, treatment of water bodies (in places where mosquitoes breed), and treatment of residential and livestock premises with insecticides. An effective insecticide is bactoculicide. It is advisable to stock ponds with gambusia, a fish that intensively eats mosquito larvae. Use mesh on windows and ventilation openings. Use repellents for personal protection.

Prophylaxis with chemotherapy does not prevent infection, but only alleviates the symptoms of the disease. People travelling to malaria-endemic areas should take chemoprophylaxis a week before travelling to the area, during the entire stay in the endemic area and for 4 weeks after returning. In foci of three-day (vivax, ovale) and four-day malaria, delagyl 0.5 g once a week and amodiaquine 0.4 g once a week can be used. With prolonged use, when the total dose of delagyl is more than 100 g, there is a risk of developing resistance. It is necessary to switch to other medications. After the end of the stay in the focal point, persons at risk of three-day malaria are chemoprophylaxis with primaquine (0.5 g - 14 days).

In areas of chloroquine-resistant tropical malaria, mefloquine 0.5 (or 5 mg/kg) once a week is recommended, provided that there are no contraindications (cardiac conduction disorders) and the parasite strains are sensitive to this drug (see Fig. 5), fancidar 1 tablet per week, fancimer 1 tablet per week can be used.

Other protozoan diseases: Babesiosis, Toxoplasmosis, Pneumocystis, Cryptosporidiosis, Isosporiasis, Acanthoamoebiasis. Leprosy. Monkeypox

CRYPTOSPORIDIOSIS. A zooanthroponotic protozoan infection with a faecal-oral mechanism of transmission. It is characterised by a predominant lesion of the digestive tract with dehydration, diarrhoea, and usually a benign course. It belongs to opportunistic infections and is severe in people with immunodeficiency conditions, primarily in patients with AIDS. The causative agent is Cryptosporidium from the family Cryptosporididae, class Sporozoasida, an obligate parasite that infects the microvilli of the mucous membrane of the digestive tract and respiratory tract of humans and animals. S. parvum is pathogenic for humans.

Sources of infection include farm animals, contaminated water and food, sick people, convalescents, and carriers of cryptosporidium. The main route of transmission is waterborne: oocysts can be infected for up to 18 months, due to their small size they can freely penetrate most filters, die only at temperatures above 72°C, and are resistant to standard disinfectants. The infection is recorded almost everywhere, and is more common in children under 2 years of age. Seasonality is the warm season. The susceptibility to cryptosporidiosis is low, with children under 5 years of age, livestock workers, veterinarians, patients with immunodeficiency states of various etiologies (congenital or acquired), and tourists being at risk.

Pathogenesis. The pathogen is most commonly found in the mucous membrane of the distal small intestine, lungs, biliary tract, oesophagus, duodenum. As a result of cryptococcal activity, intestinal microvilli are damaged, lactose deficiency develops, which leads to a decrease in absorption with the development of secondary malabsorption syndrome and osmotic diarrhoea, ionic balance is disturbed, and fermentative dyspepsia occurs.

Clinical manifestations. Clinical manifestations are based on acute diarrhoeal syndrome that develops 2-14 days after infection and is characterised by acute enteritis or gastroenteritis. The severity of symptoms depends on the state of the patient's immune system. In patients without immunodeficiency, there are abundant, watery (choler-like) stools with a very unpleasant odour with a frequency of up to 20 times a day. Diarrhoea lasts for 7-10 days (2-26 days). The patient may lose from 1 to 15 litres of fluid per day. Profuse diarrhoea can be accompanied by moderate spastic abdominal pain, nausea and vomiting (in 50%), a slight increase in body temperature, lack of appetite, headache, flatulence. In children, the diagnosis is complicated by the presence of catarrhal phenomena.

In people with immunodeficiency conditions (on the background of long-term treatment with immunosuppressants, hormone therapy, chemotherapy, patients with AIDS), the course of the disease is prolonged or chronic, and may recur, leading to significant weight loss and exhaustion. The clinical picture of colitis or enteritis is accompanied by spastic pain in the upper abdomen, fever, intoxication, and dehydration.

Respiratory cryptosporidiosis is a variant of the extraintestinal form, characterised by a severe course, often fatal. Clinically, it manifests as interstitial pneumonia with dyspnoea, prolonged cough, lymphadenopathy, and respiratory failure.

Diagnosis. The material for the study is faeces, sputum, duodenal contents. Immunological methods include immunoblotting, RIF, ELISA. PCR can also be used.

Treatment. Rovamycin, paramomycin, azithromycin (0.5 g once daily) are used as etiotropic drugs. In patients with AIDS, azidothymidine and nitrazoxamide are indicated. Pathogenetic and symptomatic therapy (rehydration, antidiarrhoea drugs, enzymes) is also necessary.

No specific prevention has been developed.

BABESIOSIS. A vector-borne disease of humans and animals caused by protozoa of the Babesidae family, it is considered a rare disease. More than 100 species of the pathogen are known, the most commonly caused by B.divergens, B.microti, B.rodhaini, other species are specific to animals (cattle, dogs, sheep, deer), and are found on all continents except Antarctica. Babesia are small protozoa that parasitise red blood cells. Unlike malarial plasmodium, babesiae do not form pigment, they do not have erythrocytic schizogonia and do not form gametocytes; they are located inside the affected erythrocytes in the centre or periphery of the cells. When stained by Gram stain, they look like thin rings with a diameter of 2-3 μm or pear-shaped formations with a diameter of 4-5 μm. Infection occurs through animal bites by ticks of the genera Dermacentor, Rhipicephalus, Hyalomma. Small rodents are an intermediate reservoir. Human infection occurs when an infected tick bites or is bitten by a diseased animal, as well as during upright childbirth, and when infected blood is transfused. Tourists, livestock workers, and shepherds get sick during the period of tick activity (spring-summer and summer-autumn seasons). The disease usually develops against the background of immunodeficiency (diabetes mellitus, post-splenectomy condition, AIDS patients, cancer patients, long-term use of corticosteroids). In people with a normally functioning immune system, the disease is asymptomatic, despite the presence of parasitemia, which reaches 1-2%.

Pathogenesis. After a tick bite, the pathogen enters the blood capillaries, then erythrocytes, where babesia multiply. The release of merozoites from red blood cells is accompanied by lysis of blood cells. As a result of babesia waste products and heterogeneous proteins entering the bloodstream, general toxicity and a pyrogenic reaction develop. Clinical manifestations appear when 3-5% of red blood cells are affected. Massive lysis of erythrocytes causes the development of haemolytic anaemia, microcirculatory disorders, haematuria, and acute renal failure.

Clinic. The incubation period lasts on average 5-15 days. The disease begins acutely, with a rapid rise in body temperature above 39 °C with severe weakness,

severe headache, nausea and vomiting, pallor of the skin, and a feeling of discomfort in the epigastrium. A characteristic feature of the disease is haematuria, hepatosplenomegaly, and anaemia. The temperature curve is constant or irregular, the duration of fever is 8-10 days. On the 3-4th day of the disease, jaundice and hepatomegaly appear. From 6-7 days, signs of acute renal failure are added. In HIV-infected and other immunocompromised patients, fever may last for 3 or more weeks, with the development of dyspnoea, severe anaemia, profuse sweating, and high levels of parasitemia (20-80%). In immunocompetent patients, the course is benign and may resolve spontaneously.

Complications. Acute renal failure, acute hepatic failure, nonspecific pneumonia, and multiple organ failure may develop.

Diagnosis. Careful collection of epidemiological history, examination of smear and thick drops of the patient's blood for confirmation, indirect immunofluorescence reaction (diagnostic titer 1:256), CBC, PCR can also be used. Patients with prolonged fever in combination with anaemia and hepatosplenomegaly on the background of ineffective antibiotic therapy should be examined for babesiosis. Differential diagnosis is carried out with tropical malaria, sepsis, blood diseases, HIV infection, haemorrhagic fever with renal syndrome.

Treatment. A positive result can be achieved with comprehensive treatment. Combination regimens are used: for mild and moderate forms, it is recommended to use a combination of azithromycin (500-1000 mg) with atovaquone (750 mg twice daily); in severe cases, clindamycin (1.2-2.4 g/day, per os or IV) in combination with quinine (650 mg every 6-8 hours) is prescribed. The duration of etiotropic therapy for immunocompetent patients is 7-10 days; in patients with immunosuppression, antiparasitic therapy is extended for 14 days from the date of negative parasitoscopy. In case of severe anaemia, blood products (red blood cell transfusion) should be used; in case of acute renal failure, haemodialysis is indicated. Vitamins and short-term glucocorticosteroids are used as part of complex therapy. The absence of etiological therapy can lead to death (in 50-80%).

Treatment of parasite carriers is prescribed in case of prolonged parasitemia (more than 3 months). No specific prophylaxis has been developed.

ISOSPORIASIS. A rarely diagnosed anthropogenic protozoan infection characterised by fever, digestive tract lesions, abdominal pain and weight loss. The causative agent is the protozoa of the genus Isospora, which is widespread in nature. In total, the genus includes more than 200 species, but only two species cause pathology in humans - Isospora natalensis and Isospora belli (I.hominis). The source of infection is humans. The mechanism of transmission is faecal-oral. Modes of transmission: water, food, household. The infection occurs by the alimentary route: protozoa enter the intestine of the patient with contaminated water or food. Transmission of the pathogen through direct contact with a sick person is unlikely, because oocysts excreted in faeces become invasive only after 2-3 days. The patient can become a source of infection from the end of the incubation period until the end of the disease and for several weeks after the disappearance of clinical symptoms. The natural susceptibility of people is low. Children and people with immunocompromised conditions, including AIDS patients, are most at risk of the disease. The parasites multiply in the cells of the epithelium of the small intestine mucosa, undergo schizogony, sexual reproduction by fission, and the formed oocysts, together with faeces, enter the external environment, where the exogenous stage of their development - the process of sporogony - takes place.

With massive isospora infection, the intestinal mucosa is destroyed with the formation of leukocyte exudate and villi atrophy, which leads to parietal digestion disorders, capillary bleeding occurs, which facilitates the penetration of pathogens into host tissues. The absorption of nutrients and vitamin B12 is impaired, steatorrhoea develops, the level of albumin and other serum proteins decreases, and the absorption of D-xylose is impaired.

Clinic. Isosporosis is characterised by symptoms of enteritis. The incubation period lasts 5-7 (up to 10) days. The disease begins acutely with an increase in body temperature (sometimes up to 39°C), the period of fever can last up to a

week. Patients suffer from headache, weakness, nausea, and cramping abdominal pain. Simultaneously with an increase in body temperature or on the 2nd - 3rd day afterwards, watery diarrhoea develops up to 10 times a day, sometimes with small amounts of mucus and blood. Some patients experience vomiting. The disease is usually acute, ending in recovery 7 to 20 days after its onset. In some cases, oocysts can be found in the faeces of people who have no obvious clinical manifestations. Occasionally, severe cholera-like forms are observed. Cases of prolonged chronic course of isosporiasis are observed in immunocompromised individuals or patients with AIDS, and the excretion of oocysts in the faeces can last for 2-12 months. In these cases, the parasites can go beyond the small intestinal mucosa and cause the development of disseminated isosporosis, which can lead to the death of the patient.

Diagnosis. The diagnosis can be made by examination of faeces and detection of oocysts (preferably daily examination for 2-3 days); to increase the efficiency of diagnostics, it is recommended to perform flotation of the test material in a saturated solution of sodium chloride by the Füleborn method, and the Darlington method is also used. Oocysts can be detected in faeces for 2 months, more often within 15-20 days after the disappearance of clinical symptoms. Duodenal probing and small intestinal biopsy can also be performed for diagnostic purposes; the ELISA method is auxiliary.

Treatment. Symptomatic and pathogenetic treatment aimed at rehydration and elimination of the main symptoms is prescribed. The drug of choice is cotrimoxazole. It is prescribed to adults: 2 tablets 4 times a day for 10 days, then 2 tablets 2 times a day for 3 weeks, metronidazole 500mg 2 times a day for 10 days is also possible. Fansidar, fazizin and other antimicrobial, antiprotozoal and antimalarial drugs are sometimes prescribed, but they are toxic and not very effective. For relapse prevention, patients with AIDS are prescribed cotrimoxazole (960mg every other day for three weeks) or pyrimethamine (25mg per day for 4 weeks).

LEPROSY (Hansen's disease, leprosy, St Lazarus disease) is a chronic anthropogenic infectious disease characterised by lesions of the skin, peripheral nervous system, extremities, mucous membranes of the respiratory tract and anterior parts of the eyeball. The causative agent is Microbacterium leprae (discovered by Hansen in 1871), Gram(+), non-motile, resistant to low temperatures and desiccation, has no capsule, does not form spores. The disease is recorded in Africa, India, Nepal, Burma, Brazil, and sporadic cases have occurred in the USA, Russia, and Europe. In 2015, 211973 thousand new cases of leprosy were recorded worldwide. The mechanism of infection is airborne, sometimes contact. The source of infection is a sick person, and close prolonged contact is required for infection (in case of contact with an untreated leprosy patient, the risk of infection is about 10%). Children in families are more likely to become infected before the age of 10. Wild armadillos and lower primates can be a reservoir of infection in nature, but no cases of human infection have been described. Men get sick 2-3 times more often than women.

Pathogenesis. Leprosy is a low-contagious, low-pathogenic disease. Subclinical infection is common. Only one third of people are susceptible to leprosy. Relatives of patients are more likely to be affected, which confirms a genetic predisposition to the disease. The entry gate is the mucous membrane of the upper respiratory tract, and it is also possible for pathogens to penetrate the skin. Accidental infection can occur during tattooing, smallpox vaccination, and surgical interventions. Given the possibility of more frequent trauma to the skin of the lower extremities, it is believed that infection mainly occurs through the skin of the lower extremities. In this case, the pathogenetic significance is given to microcirculatory disorders, varicose veins and mycoses of the feet - especially epidermophytosis and candidiasis.

The resistance of the infected organism and the virulence of the pathogen determine the form of the disease. It is assumed that a minor infection stimulates cellular immunity, resulting in the development of a tuberculoid variant of the disease. Massive infection reduces the immune potential, resulting in the

development of the lepromatous type. The hormonal background is also important: the first manifestation may occur shortly after puberty, during pregnancy or after childbirth. During these periods, new lesions may appear and old ones may become active. Immunity in leprosy is cellular in nature, it is minimal in the lepromatous form of leprosy and maximal in patients with tuberculoid type.

Clinic. According to the variants of the course, there are lepromatous type (LL), tuberculoid type (TT), borderline lepromatosis (BL), borderline tuberculoid (BT), borderline leprosy (BB), and undifferentiated leprosy. The incubation period ranges from 6 months to several decades, with an average of 3-6 years, and is asymptomatic. In the prodromal period, moderate vegetative and vascular disorders are possible: swelling of the extremities, paresthesias, cyanosis, decreased sweating, and fever.

The lepromatous variant is the most contagious and has a severe course. Skin lesions look like spots, papules, nodules (lepromas), plaques of different colours, the surface is smooth or with fine scaling, without clear contours, with a seal in the centre, and continuous infiltrates may form. Localisation is more common on the face (nose, auricles, eyebrows, cheeks), limb joints, lower legs, and buttocks. Baldness of the outer third of the eyebrows is typical.

In addition to the skin, the mucous membranes of the upper respiratory tract, the anterior parts of the eyeball, and internal organs are affected. On the infiltrated surface of the affected tongue, dense papules with a flat surface covered with a whitish coating due to epithelial exfoliation ("silver tongue") may appear. When the nervous system is affected, severe pain along the nerve endings is gradually replaced by a decrease in all types of sensitivity (pain, temperature, tactile). Eye damage is possible - keratitis, episcleritis, iridocyclitis, iritis. Partial or complete loss of vision may occur as a result of inflammatory infiltration, clouding, ulceration and scarring of the cornea after lepromatous keratitis without treatment. If the epiglottis is involved, voice loss up to aphonia occurs. In the later stages of the disease, ulcerative changes in the lepromas lead to perforation and deformation (saddle nose, facies leonine, tongue shortening, palatopharyngeal ankylosis),

against the background of atrophy of the facial muscles, the face becomes mask-like (St Anthony's mask), and atrophy of the circular muscles of the eye leads to incomplete closure of the eyelids (lagophthalmos).

The endocrine glands are also affected, especially the sexual sphere: premature menopause, decreased sexual function up to impotence, development of orchitis, epididymitis in men, adnexitis and oophoritis in women, resulting in frequent infertility. The general picture of leprosy, and especially the lepromatous type, is characterised by exacerbations - leprosy reactions. They are triggered by concomitant diseases, neuro-emotional factors, colds, surgery, treatment regimen disorders, iodine abuse, and are more common in spring and autumn. Very often, leprosy reaction begins during pregnancy, childbirth and lactation. They are clinically manifested by activation of all leprosy manifestations. Relapses of exacerbation reactions are accompanied by damage to the lymphatic vessels, impaired rheological properties of blood and platelet aggregation, which leads to lymphostasis and the development of elephantiasis (hence one of the old synonyms for leprosy - elephanthyasis graecorum).

The tuberculoid variant has a more benign course, characterised by the formation of myatrophies, trophic ulcers, and mutations due to damage to the peripheral nervous system. Tuberculoid leprosy is characterised by early changes in pain, temperature and tactile sensitivity not only in the areas of the rash but also around it, where the skin is not clinically affected. It usually begins with the appearance of a depigmented spot or small papule with clear contours and hypersensitivity within its boundaries, then the rash merges and forms elements in the form of discs, rings, and semi-rings. Along the periphery of the rash foci, there is a zone of doughy consistency that rises above the skin surface due to merging lichenoid, papular elements. Along with the rash elements, thickened nerve trunks are palpable, resulting in muscle atrophy. The muscles of the extremities are more often affected, contractures, neurotrophic ulcers, and mutation (shortening) of the phalanges develop. After the rash regresses, depigmentation and skin atrophy remain, and hair follicles and sweat glands disappear.

The borderline type is characterised by the predominance of neurological symptoms. The disease is manifested by the appearance of a scanty, unstable and predominantly spotted rash of various sizes and shapes on the skin. The spots are often erythematous and squamous with a brownish-yellow or rusty tint, with clear contours, and may be depigmented or hyperpigmented. Within a few months, paralysis, paresis, muscle atrophy, contractures, trophic ulcers on the soles of the feet, atrophy of the sweat glands and hair follicles develop, and the face becomes mask-like due to amygdala.

Undifferentiated leprosy - in case of early detection of the initial skin manifestations of the disease (leprosy), when a certain type has not yet formed. The most typical location in adults is the buttocks, lumbar region, thigh, shoulder; in children, the rash is located disseminated on the trunk and limbs, except for the "immune" zones. At the same time, in the corresponding area of irradiation, sensitivity is lost up to anaesthesia, reflexes are reduced, various motor, vascular and trophic disorders, paralysis, contractures, amyatrophy, deep, including penetrating ulcers appear. The clinical picture of polyneuritis with neurological symptoms is typical of undifferentiated leprosy.

Diagnosis. It is based on an assessment: epidemiological history, clinical findings (rash, eyebrow loss, amyotrophy, contractures, polyneuritis); results of functional tests for sensory and sweating disorders (Minor test, histamine test, nicotinic acid test); bacterioscopic index (detection of bacteria in smears from the affected skin and nasal mucosa, from the point of the affected lymph nodes; Fite-Faraco, Ziehl-Nielsen stain); results of pathological examination of a skin sample from the edge of the lesion (detection of M. Leprae); study of immunological reactivity of the body (lepromine test: intradermal injection of 0.1 ml of lepromine). Lepromine test (Mitsuda reaction) in healthy people, in patients with tuberculoid and borderline type will be positive, in case of reduced or absent resistance - negative. Malignant lepromatous type is characterised by a negative lepromin test along with the detection of a large number of Hansen's bacilli in the mucous secretions of the cartilaginous part of the nasal septum.

Undifferentiated leprosy is characterised by unstable results of humoral and cellular immune reactions, including the lepromine test. Therefore, the lepromin test in this case is of prognostic significance: if the results are negative, the process can transform into a severe lepromatous form, and if the results are positive, it can transform into a tuberculoid type.

The bacterioscopic index is the number of bacteria in the smear (the index value is directly proportional to the degree of infectivity of the patient with leprosy):

*0 = none detected in 100 fields of view;

*1+ = 1-10 bacteria per 10 fields of view;

*2+ = 1-10 bacteria per field of view;

*4+ = 10-100 bacteria per field of view;

*5+ = 100-1000 bacteria per field of view;

*6+ = more than 1000 bacteria per field of view.

It is more difficult to confirm the diagnosis of lepromatous and undifferentiated types when leprosy mycobacteria are absent. In these cases, it is possible to use the complement binding reaction (CBR) and the precipitation reaction, a biological test on guinea pigs.

Differential diagnosis is carried out with mycoses, sarcoidosis, lichen planus, vitiligo, onchocerciasis, toxicoderma, cutaneous leishmaniasis, tertiary syphilis, tuberculosis of the skin, systemic lupus erythematosus, erythema nodosum, frambesia, and Kaposi's sarcoma.

Treatment. Complex treatment is carried out with the participation of narrow specialists (ophthalmologist, orthopedist, surgeon, neurologist, physiotherapist). Patients are hospitalised in a leprosarium. According to WHO recommendations, sulfonated drugs such as dapsone, leprosan, sulfetron, avlosulfone, in combination with clofazimine and rifampicin, and ethionamide and ofloxacin may be prescribed as etiotropic therapy. A monthly combination therapy regimen is used for up to two years, until M. Leprae disappears from the biopsy. If necessary, corticosteroids, NSAIDs, multivitamins, immunomodulators, drugs to

improve nerve conduction, physiotherapy and surgery are prescribed. The average duration of therapy is 3-3.5 years. Outpatient treatment is possible if the patient is free of mycobacteria for 6-12 months after the course of treatment. With timely diagnosis in modern conditions, leprosy is a curable disease.

Complications: blindness, leprosy mutations, contractures, paralysis, nephritis, hepatitis, pneumonia, infertility, facial disfigurement. There is no specific prevention. Patients are isolated and contact persons are given preventive treatment based on a lepromine test. Newborn babies of infected mothers are isolated and put on artificial feeding. Children are usually born healthy. In endemic areas, sanitary and educational work is carried out, as well as mass examinations to actively identify patients. Contact persons are monitored for at least 7 years. Prevention of morbidity among medical personnel is based on strict adherence to sanitary and hygienic rules.

MONKEYPOX (Latin: variola vimus, English: monkeypox) is a rare natural and focal zoonosis characterised by vesicular pustular rash, fever, intoxication, and occurs in the humid tropical forests of Central and West Africa. The causative agent is a DNA-containing virus of the genus Orthopoxvirus (OVM), family Poxviridae, first isolated in 1958 from sick monkeys, grows and multiplies on chicken embryos, very similar to smallpox virus (SV). The source of infection can be monkeys, African squirrels, some wild animals, and a sick person during the rash period. The most susceptible to monkeypox are children and people who have not been vaccinated against smallpox. Humans become infected through direct contact with an infected animal or a sick person, or by eating the internal organs of sick animals without heat treatment.

Pathogenesis. The pathogenesis of monkeypox is based on systemic damage to internal organs (mainly lungs), suppression of the immune system and interferon (IFN) system. The disease is characterised by changes in biochemical parameters that indicate impaired kidney, liver and lung function. The upper respiratory tract is the entrance gate to the infection. The pathogen is transmitted by airborne droplets and through household items, toys and other things infected with the contents of

smallpox pustules. The primary site of virus propagation in humans is the cells of small bronchi and bronchioles, and then the lungs are involved in the pathological process. Subsequently, the virus penetrates the regional lymph nodes and multiplies in them. From the affected lungs and regional lymph nodes, the virus enters the bloodstream and is killed by phagocytic cells of the internal organs rich in reticuloendothelium. Reproduction of the virus in the affected cells leads to a second wave of viremia at the end of the incubation period or at the beginning of the disease, with the pathogen penetrating the skin epithelium, mucous membranes of the upper respiratory tract and internal organs from the blood. As a result of intensive virus multiplication, specific lesions develop in the lower layers of the epithelium of the skin and mucous membranes. The death of monkeypox patients occurs as a result of viral infection and to a much lesser extent due to the addition of bacterial microflora.

Clinical course. The clinical course of monkeypox in humans is characterised by 4 periods: incubation, prodromal, rash and convalescence. The incubation period lasts 7-21 days. The onset is acute, sudden, with a rise in body temperature to 39-39.5°C, weakness, headache, nausea, arthralgia, pain in the muscles of the back and lower extremities. Important symptoms of monkeypox are pain in the lower back, frontal part of the head, occipital or generalised headache. All manifestations are accompanied by severe intoxication. This period lasts from 48 to 120 hours. Lymphadenitis develops almost immediately (in 85-90% of patients), which is the main difference between monkeypox and smallpox. The submandibular, cervical, hyoid, and inguinal lymph nodes are affected. On the 3-4th day of the disease, the temperature drops to subfebrile and a rash appears on the skin of the face, then on the upper extremities and trunk, with a characteristic centrifugal location. The development of the rash element is staged: from a macule (6-10 mm) to a vesicle with navel-like involvement, then pustulation and crusting with a final scar. During vesicle suppuration, the body temperature rises again to 39-40°C, and infectious and toxic shock may develop. In severe forms, the number of rash elements reaches 100 or more. Enanthema may develop with the formation

of painful erosions and ulcers. The condition improves from 9-10 days, crusts form. The total duration of the disease is 2-4 weeks. Sometimes there are relapses of the disease, mild forms are possible. The mortality rate is 10-15% (in severe forms of smallpox, 50-100%). The development of complications is due to the addition of secondary bacterial infection (pneumonia, sepsis, encephalitis, abscesses, phlegmon).

Diagnosis. To confirm the diagnosis, it is important to have epidemiological data (stay of an unvaccinated person in an endemic area, contact with exotic African animals). Laboratory methods include real-time PCR (100% specificity) and virological methods (isolation of the virus from infected 12-day-old chicken embryos). In the general blood test, lymphocytosis is detected in the first days of the disease, and leukocytosis with a left shift and an increase in ESR in the suppurative stage. Urinalysis may show albuminuria, cylinders, erythrocytes.

Differential diagnosis is made with smallpox, varicella, and vesicular rickettsiosis. In smallpox, there is no lymphadenitis, the size of the rash elements is smaller, prone to fusion, and the final scars are more pronounced. Vesicular rickettsiosis is not transmitted from humans, characterised by a primary affect 7-10 days before the onset of fever, with regional lymphadenitis, and healing lasts 3-6 weeks. Chickenpox is characterised by 3-4 waves of rash in 24-48 hours, with no stages.

Treatment. Treatment in a boxed infectious disease hospital, with strict isolation for 17 days (due to the difficulty of differential diagnosis with smallpox). No etiotropic therapy has been developed. Currently, the development of drugs based on nucleoside analogues is being actively discussed. Careful skin and mucous membranes should be taken to prevent secondary bacterial infection: treatment of pustules with 2% potassium permanganate solution, application of tetracycline eye ointment behind the eyelids during the period of pustulation, treatment of the oral cavity with 3% borax glycerin or 1% sodium bicarbonate solution, control of cleanliness of linen. According to the indications,

detoxification, analgesics, vitamins, broad-spectrum antibacterial drugs, sleeping pills. The discharge criterion is clinical recovery.

Prevention. Vaccination against smallpox is a method of specific prevention against VZV. In case of disease, quarantine is established in the area for 17 days, and contact persons are monitored in quarantine.

ACANTHAMOEBIASIS. Protozoa, caused by pathogenic amoebae of the genus Acanthamoeba, usually manifests as acanthamoebic conjunctivitis and keratitis, dermatitis or granulomatous encephalitis. There are 6 species of amoebae that are pathogenic to humans: A. hatchetti (causing eye lesions), A. palestinensis and A. astronyxis (causing CNS lesions), A. polyphaga, A. Culbertsoni, A. castellanii (causing various lesions, including skin). The pathogen is an aerobic unicellular organism that lives freely in soil, water supply systems, stagnant fresh water of natural and artificial reservoirs, especially in sewage contaminated water. The best conditions for Acanthamoeba are water temperatures above 28°C and the presence of various organic substances. Under unfavourable conditions (lower ambient temperature, drying out of the reservoir, exposure to disinfectants and antiseptic substances), it can transform into cysts and remain viable. Upon ingestion, acanthamoebiasis pathogens revert to a vegetative state and become capable of parasitism. The source of infection is contaminated soil or water. Most often, the infection occurs through water and food, less often through contact with the environment (ingestion of pathogen cysts on the skin and mucous membranes of the eyes). Quite often, pathogenic amoebae can be detected in nasopharyngeal mucus and faeces of a healthy person without the development of a pathological process. With a decrease in the activity of general or local immunity (HIV infection, diabetes mellitus, malignant neoplasms, etc.), the number of protozoa increases with the development of disease.

Clinic. There are 3 main forms of acanthamoebiasis, which are characterised by different localisation and symptoms of the infectious process:

* Keratitis is a predominant lesion of the cornea, in which the patient complains of burning in the eyes, light intolerance, sandy sensation, blurred vision,

lacrimation, and itchy eyelids. The progression of the disease without proper treatment leads to disc-like opacities, uveitis, iridocyclitis, and perforation (formation of a through hole) of the cornea.

* Acanthamoebiasis of the skin is a fairly common clinical form that can be of primary and secondary origin. In case of primary development of the pathological process, the disease is self-limited (when water contaminated with amoeba cysts gets on the injured skin). Clinically, the pathological process is characterised by the appearance of small papules (nodules) or dark blue spots on the skin of the face, back, and chest. They have an average size of 0.5 to 3 cm in diameter. With the progression of the pathological process, spots and nodules turn into crusted ulcers. Subsequently, without adequate treatment, abscesses of muscles, lymph nodes, liver, lungs and other internal organs may form. The secondary process develops as a result of acanthamoebiasis of the brain.

* Central nervous system damage in acanthamoebiasis causes the development of granulomatous encephalitis, which occurs when acanthamoebae are haematogenously introduced into the brain from primary sites (cornea or skin), and from the moment pathogens enter the brain until the first clinical signs of the disease appear, it can take from several weeks to several years. The pathological process is localised in the brain tissue, basal ganglia, and vasculature. If the body's resistance is normal, granulomatous inflammation develops; if it is reduced, a necrotic process occurs. The initial period of acanthamoebiasis has no specific symptoms, characterised by intermittent subfebrile, drowsiness, headache, lumbosacral muscle cramps, and convergence disorder. Progression of the process leads to coma and death.

Diagnosis. Diagnosis is based on the detection of vegetative and cystic forms of acanthamoebae in the test material. In case of keratitis, lacrimal fluid, corneal washings and scrapings are examined; in case of dermatitis, the content of infiltrates, skin biopsies; in case of granulomatous encephalitis, cerebrospinal fluid is examined. The culture method, serological tests, and biological samples are also used to verify the diagnosis of acanthamoebiasis. Due to the absence of specific

symptoms, narrow specialists should be involved - ophthalmologist, neurologist, dermatologist - to exclude keratitis, encephalitis and dermatoses of other etiologies.

Treatment. The basis of adequate therapy is the use of antiprotozoal agents, antibiotics to which pathogenic amoebae are sensitive. Therapeutic approaches differ depending on the clinical form:

*Keratitis - mandatory refusal to wear contact lenses, topical remedies include hourly instillation of eye drops containing glucocorticoids, antibiotics (gentamicin, polymyxin, neomycin) and antifungal component (amphotericin, ketoconazole), applications with appropriate ointments. If there is a threat of corneal perforation, surgical treatment with keratoplasty is recommended.

*Skin lesions - systemic antibiotic therapy with aminoglycoside drugs, local topical application of ointments with neomycin, polymyxin is performed.

*Acanthamoeba encephalitis is fatal in most cases. Intravenous administration of amphotericin B is prescribed, and a combination of trimethoprim and sulfamethoxazole, aminoglycosides may be used.

Prevention consists in following personal hygiene rules and limiting contact with contaminated water bodies that are habitats for acanthamoebae.

PNEUMOCYSTOSIS. A protozoal disease caused by Pneumocystis jiroveci, which is one of the most common causes of pneumonia in cancer patients receiving immunosuppressive therapy, AIDS patients (80% of all opportunistic infections), and primary immunodeficiencies. The causative agent is Pneumocystis jiroveci, a member of the unicellular fungi Ascomycetis fungi, widely distributed among humans and animals (from 1 to 10% of healthy people are carriers of pneumocystis). They are transmitted by airborne droplets. The natural habitat under normal conditions is the lungs of humans and some mammals, but the pathological process occurs only in immunocompromised individuals. The life cycle is structured in such a way that 2 main forms of this microorganism can be detected in the alveolar tissue: small uninucleated trophozoites (1-5 μm) and cysts (10 μm) with a thick wall and containing 2 to 8 cells (1-2 μm) called sporozoites.

When a mature cyst ruptures, the sporozoites continue their developmental cycle in the alveoli, turning into trophozoites, or are released into the external environment (with mucus droplets when coughing).

Pathogenesis. The leading role in the development of the pathological process is played by disorders of cellular immunity mechanisms, severe dystrophy of type I alveolocytes and reparative hypertrophy of type II alveolocytes, which gradually disrupt the gas exchange functions of the alveolar epithelium, characterised by the development of hypoxaemia, respiratory alkalosis, and increased alveolar-capillary permeability. With a defect in cellular immunity and a decrease in the functional activity of alveolar macrophages, the pathogen actively multiplies and its endogenous stages (trophozoites, precysts and cysts) fill the alveolar cavity. The alveolar exudate takes on a typical foamy appearance, and microscopy reveals pneumocysts, cellular detritus, leukocytes, and fibrin. As a result of these processes, severe respiratory failure of the restrictive type develops. Extrapulmonary lesions are rare, associated with impaired cellular immunity, and may affect the internal organs of the gastrointestinal tract, heart, thyroid gland, skin, lymph nodes, and bone marrow.)

Clinic. The incubation period is 1-8 weeks. Patients with AIDS may have a prodromal period of 2 to 10 weeks. The edematous (first) stage lasts 7-10 days: gradual development of subfebrile, moderate dyspnoea during physical activity, dry cough, and signs of intoxication. Auscultation reveals unstable, differently calibre, moist rales.

The atelectatic stage lasts 3-4 weeks, is characterised by fever up to 39-40°C, dyspnoea at rest, increased dry cough (productive cough is rare), and sputum production is possible. Dry, less often - moist rales, crepitations in the basal regions are often heard in the lungs. Examination reveals tachypnea, tachycardia, cyanosis, hepatosplenomegaly. Dyspnoea gradually increases, up to 40-60 respiratory movements per 1 minute, pneumothorax, cardiopulmonary insufficiency are possible.

The emphysematous stage is characterised by a decrease in dyspnoea, improvement of the general condition, normalisation of temperature, and a boxy sound on percussion examination.

PNEUMOCYSTIS PNEUMONIA (PCP) in AIDS is usually characterised by a long chronic course. Initially, auscultatory symptoms are not detected, and the radiological picture may also remain without pathological changes. With the progression of the disease, bilateral root infiltrates appear, which then transform into focal or interstitial changes. Occasionally, solitary nodules are detected, which can be necrotised with the formation of a large central cavity.

Complications: RDS, pneumothorax, pulmonary infiltrates abscessing due to secondary bacterial and fungal flora, exudative pleurisy.

Diagnosis. To detect Pneumocystis jiroveci, sputum examination is required (usually obtained after ultrasonic inhalation with hypertonic NaCl solution), and if the result is negative, bronchoalveolar lavage (BAL) is performed. The BAL method is a common method of diagnosing PCa, with a diagnostic value of more than 90%, and transbronchial biopsy using fibrobronchoscopy is also possible. Chest X-rays at an early stage of the disease show almost no pathology, while later on, root diffuse cloudy infiltrates in the form of a butterfly can be seen. CT scan of the chest cavity can reveal thickened interlobular septa and the symptom of "frosted glass" (reduced transparency of the lung tissue with a vascular pattern on this background). Direct RIF with monoclonal antibodies, RNIF to detect the pathogen in lavage fluid or sputum, and quantitative PCR are also used. It is imperative to test a patient with HIV when a PCR is detected.

General blood test - anaemia, leucopenia, thrombocytopenia, eosinophilia, significantly increased ESR (40-60 mm/h). The LDH test is prognostic: the level of lactate dehydrogenase reflects the level of lung damage, correlates with respiratory failure, and activity over 500 IU/l is an unfavourable sign.

Differential diagnosis is carried out with pulmonary tuberculosis, pulmonary embolism, other pneumonia (fungal, chlamydial, cytomegalovirus, mycoplasma, legionella and other bacterial etiologies).

Treatment. Treatment is carried out in an infectious diseases hospital. The main etiotropic drugs are trimethoprim-sulfamethoxazole (Biseptol, Bactrim) and pentamidine isothionate. Trimethoprim-sulfamethoxazole is administered intravenously 20mg/100mg/day in 500ml of 5% glucose solution for 2 weeks, then orally for another 2 weeks. Pentamidine is prescribed for long-term therapy of PCP, a dose of 4mg/kg/day intravenously or intramuscularly in 250 ml of 5% glucose solution for 3 weeks. It is advisable to prescribe folic acid preparations at the same time. For inhalation, an aqueous solution of pentamidine isothionate is available (600 mg per inhalation for 3 weeks). If within 4-5 days a patient with PCP without HIV infection (in patients with HIV on day 8) has no effect from the prescribed therapy, it is possible to use alternative drugs: alpha-difluoromethylornithine (DFMO) 18g/1m^2 body surface/day for 8 weeks, trimethrexate, eflornithine, atovaquone. In AIDS, anti-relapse chemotherapy is mandatory, primarily when the CD4 cell count reaches 200 or less cells per 1 μl. To prevent relapses, bactrim, dapsone, and the aerosol form of pentamidine are used.

Prevention. In wards with immunocompromised patients, if a patient with pneumocystosis is detected, isolation is required. Chemotherapy is used to prevent the development of pneumocystosis.

TOXOPLASMOSIS is a zoonotic parasitic disease of humans and animals, characterised by damage to the nervous system, myocardium and eyes, lymphadenopathy, and hepatosplenomegaly. The disease is included in the list of HIV-associated diseases, can be activated in the late stages of HIV infection, and causes mostly severe encephalitis. The causative agent is *Toxoplasma gondii*, an obligate intracellular parasite of the class Sporozoites, subclass Coccidia. Toxoplasma has a complex life cycle, goes through phases of sexual and asexual reproduction. There are three main periods of development: tachyzoite (trophozoite), tissue cyst (bradyzoite), oocyst (sporozoite). Sexual development (gametogeny) of the parasite occurs in the epithelial cells of the small intestine of the final host - domestic cats and other felines - with the formation of immature

oocysts, which are excreted in the faeces into the environment. A few days later, they form sporozoites in the soil that can become invasive for a year. Asexual reproduction of toxoplasma occurs in the macrophage system of intermediate hosts - mammals (including humans) and some bird species. In the process of asexual development, trophozoites (reproduction stage) and tissue cysts (persistence stage) are formed. The intermediate host does not release the pathogen into the environment. Toxoplasma is widespread in nature, and due to its high susceptibility, the population's infection rate ranges from 10 to 90%. An important feature is the possibility of intrauterine infection with severe developmental abnormalities. In most people, infection occurs at an early age. In an infected person with normal immunity, tissue cysts are formed (mainly in the muscles and brain), which contain live, slowly dividing protozoan forms that remain in the human body for life.

Human infection occurs through:

1) food (vegetables, fruits), water and hands contaminated with oocysts excreted in cat faeces; consumption of meat from infected animals without sufficient heat treatment containing protozoa (most often pork and lamb), unpasteurised milk; contact with contaminated soil;

2) rarely, transmission of tachyzoites from a pregnant woman to the fetus through the placenta during parasitemia (vertical infection, exclusively during primary infection);

3) very rarely, accidental contact with tachyzoites (rarely transfusion of blood or blood products - mainly leukocyte concentrate, organ transplantation, laboratory infection, skin damage with a contaminated instrument).

Toxoplasmas are found in all human biological fluids, but due to the low number of pathogens, there is no human-to-human transmission (except for the transplacental route in pregnant women). Toxoplasmosis is not transmitted by sexual or airborne droplets.

Pathogenesis. In 95% of cases, toxoplasma infection occurs orally: cysts or oocysts enter the gastrointestinal tract, penetrate the epithelium of the lower small

intestine, and then the mesenteric lymph nodes. As a result of the pathogen accumulation, mesadenitis occurs, which, in the context of a decrease in the body's defences, leads to parasitemia with subsequent dissemination. The formed cysts exist for life in the liver, spleen, muscles, brain, and eye tissues. The process of toxoplasma multiplication is accompanied by the release of toxins and allergens. The acute or latent form is followed by a chronic form.

In congenital toxoplasmosis, parasitemia results in the formation of a primary focus in the placenta, and the severity of the consequences for the fetus depends on the gestational age. Early infection results in stillbirth, spontaneous miscarriage, severe malformations, or the development of a generalised form of toxoplasmosis. In the last trimester of pregnancy, asymptomatic forms with late onset of clinical symptoms prevail.

Risk factors for the development of severe form (generalised form, ocular form) are immunodeficiency states of any etiology, especially immunosuppressive therapy after organ transplantation; chemotherapy of malignant tumours; immunosuppressive treatment for other reasons; HIV infection (toxoplasmosis of an internal organ indicates AIDS); embryonic period. The development of immunosuppression can lead to reactivation of the disease: tissue cysts rupture and latent forms contained in them turn into invasive tachyzoites (endogenous invasion).

Clinic. The incubation period of the acquired form is from 2 weeks to 2 months (on average 4 weeks). Parasitemia lasts 1-3 weeks. The risk of fetal infection is 17-25 % in the first trimester of pregnancy, 25-54 % in the second trimester and 60-90 % in the third trimester. The patient does not infect contact persons. Clinical course depends on the type of invasive protozoan form, source of infection, pathogenicity of the strain, state of the immune system and intensity of infection. In immunocompetent individuals, it is usually asymptomatic or mild (85% of cases). Depending on the mechanism, acquired and congenital toxoplasmosis are distinguished.

Congenital toxoplasmosis occurs as a result of an acute infection in a pregnant woman. Generalised, manifest forms occur in 25-30% of cases, in other cases the course is latent. The severity of the disease depends on the state of the newborn's immune system and the availability of preventive treatment for the pregnant woman. Clinically, congenital toxoplasmosis is characterised by CNS lesions (encephalitis, convulsions, calcifications, hydrocephalus), thrombocytopenia, eye lesions (nystagmus, anophthalmia, microphthalmia, eye muscle paralysis), and jaundice.

Acquired toxoplasmosis is latent in most cases (80-90%) and is detected by chance during serological examination. Acute toxoplasmosis is characterised by lymphadenopathy and intoxication. One group of lymph nodes is more often affected (cervical, jaw, supraclavicular, axillary, mesenteric), generalised lymphadenopathy is less common. Depending on the symptoms, encephalitis, typhoid, and mixed forms are distinguished. After the primary infection, non-sterile immunity is formed, and after the acute process subsides, the transition to a secondary chronic form is possible.

Chronic acquired toxoplasmosis has a latent course and is diagnosed serologically. Clinical manifestations may include lymphadenopathy, prolonged subfebrile, various allergic reactions, arthralgia, myalgia, carditis, haemorrhagic syndrome (haemorrhages, bleeding), eye lesions (chorioretinitis, uveitis), CNS lesions (neuroses), and vegetative disorders.

In most cases, toxoplasmosis in pregnant women is subclinical and diagnosed serologically. Infection in the first trimester of pregnancy leads to spontaneous miscarriages, intrauterine death of the fetus or severe congenital malformations; in the second trimester, 20-30% of newborns have various manifestations of congenital pathology (chorioretinitis, seizures, brain calcifications, microcephaly, anophthalmia). In the case of infection in the third trimester and intrapartum, about 5-10% of newborns have clinical manifestations of active infection, and signs of CNS and eye damage occur several years later in infants without clinical manifestations of infection.

Toxoplasmosis in patients with HIV/AIDS: when the CD4 cell count drops below 200 cells/mL, the latent and chronic forms may turn into generalised forms. Clinically, the disease is severe, with predominantly nervous system involvement (encephalitis, panencephalitis, myelitis, arachnoiditis), pneumonia, myocarditis, chorioretinitis, small intestine and other internal organ damage.

Worm infestations of tropical and subtropical regions: ankylostomiasis, clonorchiasis, fascioliasis. Paragonimosis. Strongyloidiasis as an HIV-associated helminthiasis. Dracunculiasis

Infections caused by some helminths from the Ancylostomatidae family, which belong to the subclass "Diseases caused by hookworms", are quite widespread in the world.

ANKYLOSTOMIASIS (synonym - Ancylostomiasis, hookworm discases).

Etiology. Ankylostomiasis unites 2 helminthiasis, which are similar in epidemiological and clinical manifestations. The causative agent of ankylostomiasis is Ancylostoma duodenale; necatrotic heartworm is Necator americanus. Dimensions of female Ancylostoma duodenale: 10-13 * 0.4-0.6 mm; male size: 8-11 * 0.4-0.5 mm.

Size of the female Necator americanus: 7.6-13.5*0.3-3.5mm; size of the male: 5.5-10*0.2-0.25mm. Necator eggs are similar to hookworm eggs.

Epidemiology. This infection affects more than 1 billion people worldwide. Ancylostoma duodenale is predominant in the Middle East, North Africa, and India, while Necator americanus is distributed in North and South America, Central and Southern Africa, Southeast Asia, China, and Indonesia. In the absence of proper epidemiological surveillance, these helminths are prone to form foci of infection in underground mines, even in temperate climates, as the temperature inside (in mines) is constantly high, which favours the development of the pathogen. The source of infection is a sick person who excretes immature hookworm eggs. Larvae in the environment can develop at temperatures ranging from 14 to 40° C (optimal 27 - 30° C) in the presence of high humidity and sufficient aeration. Ankylostomiasis is most often contracted through vegetables, fruits, herbs and dirty hands.

Infection with necatosis occurs through contact with the soil, most often when walking barefoot or lying on the ground. However, infection is also possible through exposed areas of the upper limbs if the person is wearing shoes, as the

larvae can crawl out of the soil onto the grass. Direct contact with the patient does not pose a danger to others.

Pathogenesis. Hookworm larvae enter the host organism mainly through the mouth and develop in the intestine, namely the 12th cecum, without migration. The necator larvae penetrate the skin and migrate through the capillaries to the large and small circulation. After reaching the lungs, they enter the gastrointestinal tract through the respiratory tract, larynx, and pharynx, where they develop into adult worms in 4-5 weeks. In addition to feeding on blood, helminths secrete special anticoagulants that contribute to prolonged bleeding.

Clinic. When hookworm larvae penetrate the skin due to their migration through the body, the clinic is represented by pathology of the chest cavity organs - eosinophilic infiltrates in the lungs and vascular pneumonia with fever and high (up to 30-60%) eosinophilia. Tracheitis, laryngitis, sometimes up to aphonia, are observed.

The intestinal phase manifests itself 30-60 days after infection - intestinal syndrome (vomiting, unstable stools, abdominal pain, general malaise, weakness) is added.

Diagnosis. The haemogram reveals hypochromic anaemia with clinical manifestations (general weakness, dizziness, shortness of breath, fatigue, weight loss, decreased appetite, and less often - increased appetite). Often, the taste is perverted (they eat lime, paper, lick metal objects). A blood smear shows microcytosis, aniso-, poikilocytosis, erythrocyte hypochromia. In the faeces (coprocytogram), erythrocytes are detected. The Gregersen's reaction to occult blood is almost always positive.

Specific diagnosis is aimed at detecting ankylostomid eggs in faeces or duodenal contents by native smear on a large glass slide.

Complications: infection of the skin in the area of the entrance gate with the development of inflammatory reactions; allergic manifestations: laryngospasm, sometimes Quincke's edema; hypochromic anaemia; in children, with prolonged parasitisation, there may be a delay in physical and mental development.

Treatment. Albendazole (Aldazol, Vormil, Nemozol) - 400mg once an hour after meals, preferably after a light dinner. Mebendazole (Vermox) - 100mg*2p/day for 3 days. Monitoring of efficacy 3 weeks after treatment, three times with an interval of 2-3 days. Pyrantel - pamoate (Helmintox, Combantrin) - 11mg/kg body weight (daily dose divided into 3 doses, with meals) for 1-3 days. Levomizole (Decaris, Ketrax) - 150mg once, 1 hour after meals.

Prevention. Identification and treatment of patients. Carrying out sanitary measures. Observance of personal hygiene rules. Do not walk barefoot in areas of ankylostomiasis, rest on the ground or lawns.

FASCIOLOSIS is a bihelminthiasis with predominantly hepatobiliary system involvement and a tendency to chronicity of the process.

Etiology. Pathogens: 2 species of Fasciola - Fasciola hepatica; Fasciola gigantica.

In Ukraine, there are sporadic cases of fasciolosis caused by Fasciola hepatica. The size of the trematode: 30mm * 10-12mm, which mainly develops in the liver and biliary tract. In the human body, fascioles last from 3-5 to 20 years. The final host of the pathogen is cattle and small cattle, horses, and rarely humans, which excrete fasciolar eggs into the environment with faeces. The intermediate host is a freshwater mollusk, in whose body larvae mature, which actively enter the water and turn into adolescent larvae - invasive larvae.

Epidemiology. Human infection occurs through ingestion of contaminated water and consumption of contaminated vegetables and herbs. Infection usually occurs in the summer months. In Ukraine, there are endemic foci in the western region (Lviv oblast). A sick person is not a source of infection.

Pathogenesis. Entering the gastrointestinal tract with contaminated food and water, adolescents turn into larvae that migrate through the intestinal wall to the abdominal cavity and then through the capsule and liver parenchyma to the bile ducts. In 3 to 4 months after maturation, sexually mature helminths moving through the bile ducts injure and sometimes lead to obstruction, with the

development of mechanical jaundice. Allergic reactions develop due to the absorption of metabolic products.

Clinic. In the clinic of fasciolosis, acute and chronic phases of the disease can be distinguished. The incubation period is 2-8 weeks. The acute stage of the disease, which lasts 3-4 months, is characterised by a picture of acute allergy with liver damage. The majority of patients have a manifest course - remitting fever, symptoms of intoxication, hepatomegaly, eosinophilia, anaemia, sometimes jaundice and allergic rash The patient complains of weakness, decreased appetite, headache, vomiting, pain in the right hypochondrium, often cough with bronchial obstruction, urticaria. During this period, eosinophilia is detected in patients (30% to 80%). The chronic period is characterised by symptoms of dyskinesia, hepatocholecystitis with a tendency to periodic exacerbations. The size of the liver increases, jaundice appears, bilirubin levels can rise to 100 μmol/l with a slight increase in aminotransferase activity. Patients lose weight, and hypochromic anaemia occurs. In the case of bacterial infection, a cholangitis clinic develops, namely, hectic fever, neutrophilic leukocytosis, a significantly increased ESR, increased levels of total bilirubin (up to 200 μmol/l) and alkaline phosphatase, dysproteinemia with a decrease in the percentage of blood albumin against the background of increased levels of α and α_2 - globulin fractions.

Prognosis: in the presence of primary or acquired immunodeficiency, the course of fasciolosis is particularly severe.

Diagnosis of acute forms: serological methods: PCR, ELISA. The use of ELISA is promising.

Diagnostics of chronic stages - parasitological examination - detection of fasciolar eggs in duodenal contents and faeces. To detect adult parasites, ultrasound, endoscopic retrograde cholangiography, which detects filling defects in the choledochus, and CT with contrast are used.

Treatment: The drugs of choice for the treatment of fasciolosis are triclabendazole once at a dose of 10-12mg/kg body weight. The efficacy is close to 100%.

Bitinol 25 mg/kg body weight per day for 10 days or 30 mg/kg per day every other day (5 times in total). These drugs affect both adult and juvenile fascioles. Therefore, they can be prescribed for both acute and chronic fasciolosis. They are low-toxic, rarely cause side effects, and are used in paediatric practice. However, these drugs are not yet registered in Ukraine.

Medical examination. Follow-up is carried out for 1-2 years. The first year - a three-time control examination 4-6 months after treatment, then every 3 months. In the second year - once a quarter.

Prevention: detection and treatment of sick people; examination and treatment of dogs; compliance with personal hygiene rules (hand washing, processing of greens, vegetables, berries containing soil particles); compliance with public hygiene rules (protection of playgrounds, parks, squares from animal visits).

CLONORCHOSIS is a biological helminthiasis that is accompanied by damage to the hepatobiliary system and pancreas. The causative agent is the Chinese two-legged tapeworm (Clonorchis sinensis), a member of the family Opisthorchide of the Trematoda class Plathelhelmintes.

Epidemiology. Human infection occurs when eating insufficiently cooked fish containing invasive metacercariae. People of working age are most often affected. Clonorchiasis is seasonal - in summer and autumn, as with opisthorchiasis. The disease is endemic: these are the regions of China, Korea, Vietnam, and Japan. There may be imported cases in Ukraine.

Pathogenesis. The shell of metacercariae dissolves when they enter the small intestine of humans or domestic and wild animals, and the larvae enter the liver through the portal system or choledochus, where they turn into sexually mature tapeworms, which begin to lay eggs after a month of staying in the host. Similar larval development can also occur in the pancreatic ducts. The first 1-2 months are characterised by toxic and allergic phenomena. Subsequently, the clinic is limited to direct damage to the biliary tract, which leads to the development of

biliary dyskinesia (biliary dysfunction), cholangitis and cholestasis, and subsequently causes carcinogenesis;).

Clinic: The disease has an acute onset, characterised by a variety of allergic manifestations: fever, generalised lymphadenopathy, polymorphic skin rash, often accompanied by pruritus, and hepatomegaly. Indigenous people living in endemic regions suffer from the disease without any clinical symptoms. In non-natives, the disease becomes manifest with hyperleukocytosis (25-30*10^9 /L); hyper-osinophilia (up to 60-70%), and increased ESR (up to 40 mm/h). With the progression of the disease, untreated patients develop symptoms of cholangitis, choledochal obstruction, which can lead to the formation of biliary cirrhosis. A typical complication of clonorchiasis is purulent cholangitis.

Diagnosis. The main method is microscopic examination of faeces (detection of eggs), more likely in the chronic period. Serological diagnostic methods (ELISA) are not used in Ukraine.

Treatment. Etiotropic therapy: praziquantel 75mg/kg body weight divided into 3 doses after meals during one day. The maximum single dose is 2g.

Pathogenetic and symptomatic therapy.In the acute period, detoxification and anti-allergic (Loratadine, Cetrin, Citril) therapy is performed. Antibiotics are used in case of bacterial flora. Dispensary observation is not regulated.

Prevention: sanitary and educational work in natural clonorchiasis areas, eating only sufficiently heat-treated fish.

PARAGONIMOSIS is a biogeolithiasis caused by the lung fluke Paragonimus westermani and characterised by predominant lung involvement.

Etiology. The helminth of the genus Paragonimidae of the class Trematoda of the type Plathelhelmintes - size: length 8-12 mm, width 5-6 mm, covered with cuticle with spines, produces oval eggs, size 60-80 * 50-55 microns, yellow-brown in colour with a cap. In water, after 1-3 months, myracidia are released from the eggs of the lung fluke, which penetrate the first intermediate host - freshwater gastropods, where sporocysts, redia and cercariae develop. The latter are able to penetrate additional intermediate hosts, such as freshwater crayfish and crabs,

where they incubate and develop into invasive metacercariae. The final hosts are pigs, cats, dogs, rodents and humans.

Epidemiology. Paragonimosis is endemic in the countries of Southeast Asia (China, Indonesia, Taiwan, Philippines) and South America (Colombia, Ecuador, Peru). Imported cases may be reported in Ukraine. The source of infection is end hosts that excrete eggs in urine and faeces. Humans become infected by eating meat from insufficiently heat-treated freshwater crayfish and crabs, as well as by swallowing river water while swimming, which contains invasive metacercariae.

Pathogenesis. Invasive metacercariae enter the duodenal section of the small intestine, where the cyst membrane dissolves and the larvae penetrate the intestinal wall into the peritoneum, and then through the liver, pancreas and diaphragm into the pleural cavity and lungs. During the migration stage, an allergic picture develops. After 2-3 months from the onset of the disease, adult worms form in the lungs from larvae that are encapsulated. The disease progresses to the chronic stage, which is characterised by the formation of parasitic cysts. In case of cyst destruction, adult helminths and their eggs may be introduced into the mesenteric lymph nodes, prostate, skin, brain, and other organs.

Clinic. The incubation period lasts 2-3 weeks. The following clinical forms of paragonimosis are noted: acute abdominal; acute pleuropulmonary; chronic pleuropulmonary. Acute abdominal paragonimiasis in many patients is accompanied by an acute abdominal clinic (with aseptic peritonitis, enteritis, hepatitis with hepatomegaly, elevated bilirubin and a slight increase in transaminases).

Acute pleuropulmonary paragonimosis is characterised by the progression of toxic and allergic phenomena: bronchial obstructive syndrome, urticular rash; temperature reaches 38-39° C, haemogram shows eosinophilia (up to 15-30%). The chronic stage of the disease develops in 2-3 months. Patients complain of chest pain, cough with purulent bloody sputum, shortness of breath, night sweats, weight loss, hyperthermia.

Complications. In case of unfavourable course of the disease, pulmonary bleeding and pneumothorax occur. It is possible to develop parasitic cysts in the brain substance, which leads to cerebral paragonimosis in the form of encephalitis or meningoencephalitis.

Diagnosis. In the migration stage: ELISA (detection of antibodies against helminth antigens); chronic stage: isolation of helminth eggs from faeces, pleural exudate and CSF. In case of pleural paragonimiasis, tissue biopsy is performed.

Treatment. Etiotropic therapy: praziquantel 75 mg/kg - a daily dose in 3 doses after meals for 1-2 days. Triclabendazole (but not registered in Ukraine). Detoxification and antihistamine therapy is also provided.

A month after treatment, sputum examination is required three times! If no helminths or eggs are found, patients are removed from the dispensary register.

DRACUNCULIASIS. Dracunculiasis (also known as rickettsial disease) is a disabling parasitic disease caused by Dracunculus medinensis, a long threadworm. It is transmitted exclusively when people drink water contaminated by water fleas that are infected with the parasite.

STRONGYLOIDIASIS as an HIV-associated helminthiasis.

Strongyloidiasis is an anthroponosis, percutaneous and oral geohelminthiasis characterised by a chronic course and the presence of two stages - early (migration) and late - with damage to the gastrointestinal tract, hepatobiliary and nervous systems.

Etiology. The causative agent is Strongyloides stercoralis. Male 0.7 mm long, 0.04-0.06 mm wide, female 2.2 mm long, 0.03-.07 mm wide parasitise the human small intestine. Eggs are oval, transparent.

Epidemiology. The disease is common in regions with warm and humid climates (Eastern and Southern Africa; Southeast Asia; South America). Infection occurs through contact with the soil: when working in the garden, walking barefoot on the ground, on the beach (percutaneous route), as well as through the dietary (when consuming vegetables and fruits) and water routes. In the body, the larvae migrate through the blood and lymphatic vessels, then settle in the upper small

intestine and grow to adults. Adult worms lay eggs, from which larvae hatch in the intestine. These larvae can migrate throughout the body, causing a variety of allergy symptoms.

If the patient's immune system is severely impaired, the migration of strongyloides can be delayed for a long time, and the number of migrating larvae increases.

All this can cause severe disorders in the patient's body. Strongyloidiasis is particularly severe in patients with AIDS, as hyperinvasion develops. In this case, the parasitic process is generalised, affecting various organs and tissues. A large number of parasites accumulate in the host's body, the disease becomes progressive with exhaustion of the body, and also becomes malignant with the development of destructive changes in the intestinal mucosa, and may be complicated by the development of peritonitis.

The most dangerous **complication** of strongyloidiasis is the generalisation of the disease (disseminated strongyloidiasis), the spread of larvae throughout the body with the development of myocarditis, meningoencephalitis and septicaemia, which can lead to death.

Treatment. Etiotropic therapy: albendazole 400 - 800 mg/day in 1-2 doses, 3-5 days; carbendacim and mebendazole 10 mg/kg/day - 3-5 days (1-2 courses). Pathogenetic therapy: desensitising drugs; antispasmodics.

Treatment control in 1-2-3 months. Dispensary supervision - 6 months with monthly monitoring of the examination.

Prevention: detection and treatment of patients; adherence to personal hygiene rules; sanitary measures.

Differential diagnosis of schistosomiasis

Schistosomiasis is a group of tropical helminth infections, severe chronic diseases that affect the digestive or genitourinary system.

Pathogens. The causative agents of schistosomiasis belong to the class of flukes.

Among the many species of schistosomes that infect animals, five are of medical importance:

Schistosoma haematobium (the causative agent of genitourinary schistosomiasis),

S. mansoni (intestinal schistosomiasis pathogen),

S. japonicum (the causative agent of Japanese schistosomiasis),

S. mekongi (causative agent of Mekong schistosomiasis),

S. intercalatum (causative agent of intercalated schistosomiasis).

The schistosomes that infect humans are bisexual. The length of females ranges from 7 to 26 mm, width - 0.17-0.3 mm, males - from 4 to 20 mm, with a width of 0.5-1.2 mm. The abdominal surface of the male has a groove - a gyneciform canal, inside which a threadlike female is constantly present. Depending on the morphological characteristics of the eggs, three groups of schistosomes are distinguished:

a) eggs with a lateral spine (S. mansoni);

b) eggs with a terminal spike (S. haematobium, S. intercalatum),

c) eggs in the form of a truncated oval with a rudimentary spine (S. japonicum, S. mekongi).

Life cycle. The development of isolated eggs occurs in water at a temperature of 10-30 °C and sufficient insolation. Miracidia leave the eggshells and actively swim due to the presence of cilia. Possessing positive chemotaxis to the tissues of the intermediate host, a mollusk, they attach to the surface of its body and gradually penetrate it. In mollusks, the development and reproduction of larval forms of schistosomes occurs, which culminate in the formation of cercariae - larvae with a tail. From 1-2 to several thousand cercariae can be released daily,

which are invasive to humans. The cercariae are equipped with an elongated forked tail, which helps them to move actively in the water. At the head end of the larva there are oral and abdominal suckers, and glands secreting a secretion that helps cercariae to attach to and penetrate the body of the final host. Cercariae penetrate the human body most actively in the first hours after leaving the mollusk; after 8-12 hours, glycogen reserves are depleted and their activity drops sharply.

The average lifespan of adult parasites in the body of their final hosts is 3 to 8 years. Individuals can live up to 30 years. After completion of sexual maturation and mating, adults migrate to the veins of the bladder (S. haematobium) or mesenteric veins (S. mansoni, S. intercalatum, S. japonicum, S. mekongi), where they begin to produce eggs. The prelative period in schistosomiasis is 30-40 days. In some cases, eggs are detected in faeces or urine at 4-6 months of infection. Each pair of worms produces from 200 to 3500 eggs per day. S. japonicum and S. mekongi have the highest reproductive capacity.

Human infection occurs through the skin or mucous membranes when in contact with or drinking water from open water bodies. The cercariae penetrate the stratum corneum and the mucous membrane, lose their tail appendage and turn into a hexosomula. Then the hexosomes penetrate the peripheral lymphatic or venous vessels, enter the right heart and lungs, and then move quickly to the liver vessels, where they develop, form adults, mature, and mate. The parasites migrate from the lungs to the portal vein system with the bloodstream and directly through the diaphragm to the liver. Female helminths lay their eggs in the lumen of venous vessels. Due to the action of a cytolytic enzyme secreted by the egg embryo, they penetrate the vessel wall and bladder or intestinal tissue, enter the bladder or intestinal lumen and are excreted in the urine or faeces of infected individuals into the environment. However, a large number of parasite eggs are not excreted from the human body, but are retained in various tissues. Most often, this process occurs in the bladder wall (in genitourinary schistosomiasis) or in the intestinal wall or liver. This feature of schistosome eggs is associated with the development of many complications of schistosome infections.

In the development of the pathological process in schistosomiasis, **acute (migration) and chronic stages** are distinguished. The acute stage of schistosomiasis is based on the sensitising effect of metabolic products of the larval stage and the traumatic effect of schistosomes during migration. During the period of cercariae penetration into the skin, a large number of passages are formed that facilitate the penetration of pathogenic microflora into the tissues, and micro haemorrhages appear. The products of schistosomal metabolism and decay cause the formation of eosinophilic inflammation. Schistosomal migration is accompanied by focal lesions of the pulmonary capillaries, manifested by edema, haemorrhage, inflammatory changes in the bronchioles, and sometimes the development of interstitial pneumonia. Inflammatory changes also develop in the liver. Parasitisation of adults in the vascular system is not accompanied by pronounced changes in the vessel wall. The main reason for the development of the pathological process in schistosomiasis is infiltration of various tissues by eggs. Eggs that do not find a way out through the bladder or intestines are carried by the bloodstream to various organs and tissues, most often to the liver and lungs. Inflammatory and allergic granulomas form around the eggs. The metabolic products of the embryos cause proliferation of the intima and underlying connective tissue, leading to the development of widespread obliterative endarteritis of the lung and liver vessels. The proliferation of fibrous tissue around the branches of the portal vein (tubular indurative fibrosis) leads to difficulty in blood flow, development of portal hypertension, accompanied by a significant enlargement of the liver and splenic compaction. Death of patients with such disorders often occurs as a result of bleeding from varicose veins of the esophagus. Obliterating endarteritis of the pulmonary vessels contributes to an increase in pressure in the small circle of blood circulation and the development of pulmonary heart.

Clinic. According to the nature of organ damage, there are genitourinary schistosomiasis and intestinal schistosomiasis. Clinical manifestations of the acute stage of schistosomiasis are similar. At the sites of cercariae penetration, cercariae

dermatitis develops, more often in non-native populations. There is a tingling sensation, itching, local erythema develops, and papular rashes appear. The severity of dermatitis depends on the number of cercariae that have penetrated the skin, the patient's age, the body's reactivity, and the frequency of infections (primary, repeated, etc.). After 5-6 days, the manifestations of dermatitis may regress and complaints of weakness, fatigue, and fever appear. During the period of schistosomal migration, while they are in the lungs, a cough appears, accompanied by the discharge of thick sputum or haemoptysis. Sometimes asthmatic bronchitis, myalgia, arthralgia, hepatosplenomegaly, and lymphadenopathy develop. The duration of the acute stage is 7-14 days, less often 5-6 weeks. During this period, blood tests reveal leukocytosis, eosinophilia, and an increased ESR. The process enters the chronic stage when the parasite has completed its development and egg production has begun. From this period on, each species form of schistosomiasis proceeds differently. This is due to differences in the localisation of adults and the ways in which eggs migrate from blood vessels to the environment.

The chronic stage of intestinal schistosomiasis caused by S. mansoni parasitisation is characterised by proliferative processes in the intestine and liver. Abdominal pain of indeterminate location and varying intensity occurs, stools become more frequent, tenesmus appears, and loss of appetite and weight is observed. Blood and mucus impurities appear in the faeces. With intensive invasion and progression of the disease, complications arise: mesenteric fibrosis, haemorrhoids, rectal prolapse, polyposis, and intestinal ulcers. Polyposis and fibrosis can in some cases lead to intestinal obstruction. Fragments of dead helminths and their eggs are carried into the liver, where they contribute to the development of necrotic and granulomatous changes. In the portal areas of the liver around the eggs, granulomas, chronic inflammation and severe fibrotic changes, in particular tubular-indurative fibrosis, develop. The schistosomal nature of the process in the liver can be suspected in patients with an enlarged (due to the left lobe) dense liver, ascites, young age of patients, absence of jaundice, eosinophilia in the peripheral blood, and a sharp increase in spleen.

In severe and prolonged infections, chronic membranous proliferative glomerulonephritis is detected. Circulating immune complexes of IgG and IgM with schistosome antigens are detected in the basement membranes.

With the development of portacavitary collaterals, schistosome eggs quickly reach the lungs, vascular obliteration develops and cardiopulmonary disorders appear.

In some cases, pseudotumours are formed in the descending colon, sigmoid colon and omentum, consisting of a large number of calcified schistosome eggs, granulomas and fibrous tissue. In some cases, schistosomiasis is asymptomatic for a long time.

Intercalated schistosomiasis is considered to be the most benign of the entire group of intestinal schistosomiases. The clinical manifestations and consequences of the disease have much in common with schistosomiasis caused by S. mansoni, but are mild and complications are very rare.

Schistosomiasis japonicum (Kataama disease) is one of the most severe forms of intestinal schistosomiasis. The severity of the course is associated with the fact that S. japonicum females produce a larger number of eggs than helminths of other species and they are laid in the form of massive clusters that stimulate a more intense tissue reaction, leading to significant intestinal damage.

Symptoms of the chronic stage appear 4-5 weeks after infection: fever, loss of appetite, weight, headaches, abdominal pain, anaemia, diarrhoea. Mucus and blood appear in the stool, and the liver and spleen become enlarged.

Clinical manifestations of Japanese schistosomiasis can vary widely - from mild to fulminant forms, quickly ending in death. This type of schistosomiasis most often develops complications: polyposis and intestinal ulcers, liver fibrosis with portal hypertension, a sharp increase in spleen and hypersplenism. Egg ingestion causes paresis, paralysis, encephalitis, and meningoencephalitis.

Mekong schistosomiasis is more common in children under 10 years of age. The initial manifestations of the disease are similar to intestinal schistosomiasis caused by S. japonicum. In most patients, hepatomegaly is detected in the early

stages, mainly due to an increase in the left lobe of the liver. One third of patients have hepatosplenomegaly. This form of schistosomiasis rapidly develops complications associated with severe portal hypertension, manifested by splenomegaly, and dilated esophageal veins. Mechanical damage to the varicose veins of the esophagus leads to bleeding, bloody vomiting, which in some cases can be fatal.

Schistosomiasis is unisexual. One of the most pathognomonic manifestations of genitourinary schistosomiasis is terminal haematuria. When the bladder walls contract, the helminth eggs pass through the mucous membrane, injuring it, so bleeding is urgent. Permanent mechanical damage to the bladder mucosa leads to the development of an inflammatory process in the urinary system. Urination becomes more frequent and painful. Secondary inflammation causes severe destructive changes and ulcers on the mucosa. The inflammatory process can spread up to the kidneys or deep into the bladder muscle tissue. A pronounced fibroblastic reaction to the accumulation of schistosome eggs initiates papillomatous growths in the bladder wall, the development of neoplastic processes, fibrosis, and calcification. This is accompanied by a decrease or even cessation of egg excretion in the urine, which is associated not with a decrease in the reproductive capacity of helminths, but also with difficulties in passing eggs through fibrous tissue. At this stage of the disease, complications develop, the ureters entering the bladder are deformed, and X-ray examination reveals narrowing or dilation of the ureters. Ureteral stenosis and fibrosis of the bladder neck, as well as papillomatous growths, can cause blockage of the ureters and, accordingly, ureteral dropsy and hydronephrosis. The presence of urological changes is often detected - calcification of the bladder walls, deformation of the ureters, hydronephrosis, non-functioning kidney, and stones in the urinary system.

In endemic areas, bladder cancer is more common in patients affected by genitourinary schistosomiasis, and histologically it is squamous cell carcinoma.

In addition to the urinary tract, the genitals are also involved in the pathological process. Infiltration of the urethra by eggs can lead to the

development of pseudo-elephantiasis of the male genital organ. Sometimes the seminal vesicles are involved in the process, and prostatitis and epididymitis develop. In women, genital lesions are clinically manifested by the formation of papillomas of the vagina and external genitalia. Very often they bleed and this is the cause of heavy, bloody vaginal discharge. As a rule, these changes are formed without any symptoms, so patients seek medical attention in the period of irreversible changes. In case of intensive infection, eggs or dead worms are carried into the lungs, liver and central nervous system. Diffuse obliterating endarteritis contributes to the development of right ventricular decompensation of the heart. When eggs enter the brain or spinal cord, a brain tumour clinic develops, and granulomatous hepatitis develops in the liver.

Diagnosis. To establish the diagnosis of schistosomiasis, it is important to indicate the presence in an area endemic for this helminthic infection and contact with open water. **For the diagnosis of infections** caused by pathogens of the intestinal group of schistosomiasis, it is recommended to use the method of a thick smear of faeces with a cellophane coating (Cato method). A response can be obtained 30 minutes after the smear is prepared. It is better to take the material for the test from the faecal surface, where the largest number of eggs is located. Scraping the rectal mucosa helps to detect schistosome eggs. Rectoromanoscopy is the most widely used instrumental method. This examination reveals hyperaemia of the distal bowel, erosion, and ulcers in the early stage of the disease. In the chronic stage, papillomas, sandy spots (accumulation of schistosome eggs) are detected. Live and calcified schistosome eggs are found in biopsies of the rectal mucosa. To determine the cause of liver fibrosis, angiography and laparoscopy are performed.

Genitourinary schistosomiasis can be suspected in a patient with terminal haematuria, dysuria, eosinophilia, moderate leukaemia and an elevated ESR. To diagnose this form of schistosomiasis, a parasitological method of urine examination for the presence of eggs is used. Urine is collected during the period of the patient's greatest activity from 10 to 14 am. Cystoscopy is a reliable and

rapid method of instrumental diagnosis of genitourinary schistosomiasis. It allows you to recognise the invasion, identify complications, and monitor the dynamics of recovery after chemotherapy. X-ray examination of the urinary system and excretory urography in 100% of cases reveals a characteristic feature of chronic schistosomiasis - extremely clear contours of the urinary tract organs. This is due to the calcification of dead schistosome eggs that have infiltrated the walls of the bladder and ureters, and the development of fibrous tissue. In addition, this test can detect strictures in the lower and dilatation in the upper ureters.

It is necessary **to differentiate genitourinary schistosomiasis** from bladder tuberculosis, haemorrhagic diathesis, renal neoplasms and urolithiasis of other etiologies.

It is necessary **to differentiate the intestinal group of** schistosomiasis from intestinal amebiasis, bacterial dysentery, balantidiasis, and liver cirrhosis.

Treatment. Currently, two drugs are used worldwide to treat schistosomiasis: praziquantel and oxamnidine. Praziquantel works on all types of schistosomes. The drug is prescribed for adults and children:

- for infections with S. haematobium, S. mansoni, S. intercatum - 40 mg/kg per day in 2 doses x 1 day.

- in case of S. japonicum, S. mekongi infections - 60 mg/kg per day in 3 doses on 1 day.

The efficacy of the drug against infections caused by S. haematobium is 80-95%. For infections caused by S.mansoni, S.intercalatum, S.japonicum, S.mekongi, the treatment effectiveness is usually above 60%. In the absence of complete treatment, the number of eggs shed in a year is reduced by 95%. Oxamnihine is active only against infection caused by S. mansoni. The drug is prescribed for adults at a dose of 15 mg/kg in one dose; for children, 20 mg/kg per day in 2 doses - 1 day. The treatment effectiveness ranges from 60 to 90%. The effectiveness of treatment is monitored after 4 months by examining faeces or urine.

Prognosis. Uncomplicated schistosomiasis can be successfully treated, even decompensated hepatoliver syndrome in schistosomiasis can be treated: in 50% of cases, there is a complete regression of symptoms. In 90% of cases, a reduction in the size of polyps is noted, and in some cases, complete regression is observed on the background of specific therapy.

Epidemiology. The group range of schistosomiasis extends along the equator between 38°N and 35°S. Schistosomiasis has been reported in 73 countries. The ranges of different forms of schistosomiasis are not the same and tend to expand continuously, which is associated with the continuous migration of the population and the creation of irrigation systems and artificial reservoirs. **Schistosomiasis is second only to malaria in terms of its socio-economic importance for public health**. Intestinal schistosomiasis is widespread in most countries of Africa and South America, in Yemen and some Caribbean islands; Japanese schistosomiasis - in the Philippines, Japan, China; Mekong schistosomiasis - in Kampuchea, Laos. A limited area of intercalated schistosomiasis has been reported in Gabon and Cameroon. Genitourinary schistosomiasis is widespread in most African countries in the Eastern Mediterranean region and in the European region (Morocco, Turkey).

The source of infection for genitourinary schistosomiasis is humans, and for intestinal schistosomiasis - humans and some rodents and cattle. In addition to humans, many species of domestic (pigs, dogs, cats, sheep, horses) and wild animals (foxes, various types of rodents) are affected by Japanese schistosomiasis. In most cases, freshwater molluscs are intermediate hosts of schistosomes. The most favourable for molluscs are stagnant or low-flowing water bodies with clean bottoms, well-developed vegetation and moderate shading, as well as reservoirs, primitively constructed or irrationally exploited irrigation canals, rice fields, etc. Mollusks usually live in fresh water, but some species (Oncomelania) can live in slightly salty water. The temperature optimum is 18-35 °C. The intensity of schistosomiasis transmission is determined by the density of the mollusc population, the rate of their reproduction and extinction, the age structure of the

population and the frequency of human contact with their habitats. High infection of mollusks is facilitated by the continuous faecal contamination of water bodies by infected people, which is typical for non-sewerage rural settlements.

People are usually infected by swimming, washing clothes, and working in irrigated fields. Infection with S. japonicum can occur through contact with grass on which infected semi-terrestrial molluscs have crawled. The susceptibility of humans to schistosome infection is general, with the most affected populations being those who are more likely to come into contact with mollusc habitats. In endemic areas, the highest rates of infection are observed in the age group of 10-20 years. Muslim men are usually affected much more often than women, whose contact with open water is less intense. Agricultural workers and personnel operating irrigation systems are at increased risk of infection. Schistosomiasis is often imported into the CIS countries by both foreigners and locals who have lived in countries endemic for these helminths.

Zoonotic diseases: sap, melioidosis, sodoc, streptobacillosis, listeriosis, foot and mouth disease

SAP. An acute zoonotic bacterial infection that occurs in humans in acute septic and chronic forms with specific damage to the skin, mucous membranes, muscles, joints and internal organs. **According to ICD-10 A24.** Sap and myeloidosis

Etiology: The causative agent of scrapie is *Burkholderia (Pseudomonas) mallei s. Halleomices mallei* is a genus of Pseudomonas, family Pseudomonadaceae.

It is a gram-negative rod 2-4 μm long, 0.5-1 μm wide with rounded or slightly pointed ends, prone to polymorphism and easy transformation to L-forms. It does not form spores or capsules, has no flagella, and grows well on conventional nutrient media with the addition of glycerol.

They are not resistant in the external environment, but under susceptible conditions in water and moist soil they can remain viable for up to 1 month, in secretions and carcasses of diseased animals - for several weeks. The pathogen is rapidly killed by heat and common disinfectants, but is resistant to low temperatures. In vitro, it is susceptible to streptomycin, tetracycline antibiotics and some sulfonamides (norsulfazole).

Epidemiology: The source and main reservoir in the wild are sick ungulates: horses, donkeys, mules, zebras, camels, as well as predators that become infected by eating the meat of sick animals. In horses, the disease is acute and fatal in 10% of cases. However, in most animals, the disease is chronic, affecting the skin, lungs and nasal mucous membranes. Animals are contagious throughout the disease.

Mechanism and routes of transmission. Transmission of the pathogen to humans occurs through close contact with sick animals as a result of their secretions getting on damaged skin and mucous membranes. Infection can also occur through re-contaminated objects (e.g. harness, straw). Contact with raw meat and the skin of dead animals is also dangerous. Rarely, infection occurs through the dietary route by drinking contaminated water. Aerogenous infection is possible in laboratory conditions. Transmission of the pathogen from a sick person is very rare.

In humans, the disease is more commonly recorded in the cold season (due to the stalling of animals).

The susceptibility of the population is very low. The incidence is mostly sporadic and occupational - veterinarians and animal caretakers. It is more common in some countries in Africa, South America and Asia. The causative agent of sapa is considered a factor in biological weapons.

Pathogenesis of sap: The incubation period lasts from 2-5 days to 3 weeks, rarely longer. The entrance gate of infection is damaged skin (microtraumas) or mucous membranes (nose, eyes, respiratory system, rarely - digestive tract). An inflammatory reaction occurs at the site of the pathogen's penetration, involving the regional lymph nodes, where an inflammatory process with purulent decay develops. The pathogen then spreads hematogenously throughout the body and causes secondary septic foci in the muscles and internal organs. A granulation-purulent process forms in the skin, respiratory tract and lungs. These foci can open up. The lungs are often affected with the formation of pneumosclerosis, abscesses, bronchiectasis. Purulent osteomyelitis and arthritis often develop. Purulent meningitis and brain abscesses may develop. In some cases, the generalisation of the process can occur without localised focal changes and is characterised by extremely severe sepsis.

Pathological anatomy: the picture corresponds to typical septicaemia with multiple abscesses in various tissues and organs. Immunity to sap is short-lived or not developed at all.

Clinical picture. The disease begins acutely with a severe intoxication syndrome. The temperature suddenly rises to 38-40 °C with chills, headache, aching, arthralgia and myalgia, severe general weakness, vomiting. The temperature curve is of the hectic type. At the site of pathogen penetration, a primary lesion is formed - a dark red papule, which quickly turns into pustules with blood, later serous-purulent contents, and in 2-3 days it turns into an ulcer. Numerous new pustules surrounded by a wide bright red border form around individual pustules and ulcers. The ulcers have a "greasy" or granulating bottom covered with pus or crusts, with undermined hard edges protruding above the surrounding tissue. Regional lymphangitis and lymphadenitis develop. In 5-7 days after a short-term decrease, the temperature rises again, which corresponds to the generalisation of the infection. The disease progresses rapidly. Multiple secondary nodules, papules, and pustules turn into

pustules and ulcers appear. Later, the process involves internal organs, most often the lungs, as well as muscles, cartilage, and bones. Abscesses and deep infiltrates are formed, followed by purulent melting. The general condition of patients deteriorates sharply. Blood pressure drops, tachycardia, heart sounds become deaf, mucopurulent or bloody sputum appears, chest pain, shortness of breath, acrocyanosis. Radiological and clinical findings include pleuropneumonia and lung abscesses. Splenomegaly is often observed. Debilitating diarrhoea is possible.

The acute form of the disease lasts 1-2 weeks and almost all of them end in death due to acute cardiovascular failure and respiratory disorders. Without treatment, the mortality rate reaches 100%.

Chronic sap develops gradually, with exacerbations and remissions over several years in skin, pulmonary and nasal forms.

The most common form is cutaneous. Pustules and ulcers with regional lymphangitis develop slowly. The ulcers heal slowly, often recur and leave large hard scars. Numerous muscle abscesses with recurrent fistulas are formed. In the pulmonary form, there is a "creeping" pleuropneumonia with predominantly lower lung lobes. Later, numerous muscle abscesses are involved.

Nasal mucosa lesions are characterised by serous-purulent discharge, ulcers spreading to the pharynx, larynx, and trachea. In the chronic course, severe intoxication, prolonged fever of the wrong type, gradual development of cachexia, often secondary infections and general amyloidosis are characteristic. The mortality rate is about 50%.

The diagnosis of sap is based on epidemiological data (contact with sick animals) and a characteristic clinical picture.

SARS is differentiated from sepsis, lung abscess, melioidosis, pulmonary tuberculosis and pulmonary forms of mycoses (aspergillosis, nocardiosis, histoplasmosis, etc.), lymph node tuberculosis, plague, smallpox, anthrax, furunculosis.

Laboratory methods used in **diagnosis** include isolation of the pathogen in Gram stained smears from ulcers, nasal mucosa, pustule contents, sputum, blood, and abscess puncture. Bacteriological inoculation of the material on glycerol or potato

glycerol agar (growth of colonies in the form of amber-brown mucous plaque). Serological reactions (RSC, RA, RGGA) in the dynamics. An additional method is an allergic test with maleic acid. Maleine is administered intradermally or subcutaneously at a dose of 0.1 ml in a dilution of 1:10 or 1:100. The test becomes positive after 10-15 days of illness. However, this test is not specific enough and dangerous for humans.

Biological test on guinea pigs (males), hamsters and cats with the development of purulent orchitis in 2-3 days (Strauss phenomenon).

Treatment. Treatment of sap is not well developed.

1. Patients are treated in compliance with the anti-epidemic regime, as well as for particularly dangerous infections. In the acute course - for the entire period, in the chronic course - until the ulcers heal.

2. Etiotropic therapy with sulfonamide drugs and antibiotics (tetracycline, chloramphenicol, kanamycin, rifampicin, ciprofloxacin, ofloxacin). Currently, sulfathiazole at 5-6 g/day for 25-30 days or norsulfazole at 6-8 g/day for a month is recommended, in severe cases - in combination with antibiotics.

3. Pathogenetic and symptomatic therapy (detoxification, anti-shock with the use of GCS in the development of SCI, oxygen therapy, vitamins, blood substitutes, immunomodulators).

4. Surgical treatment of abscesses.

5. Topical remedies for chronic scabies - rubbing mercury ointment (2-3 g/day) with iodine into the skin, cauterising scabies nodes. ULTRAVIOLET LIGHT.

Prevention. Quarantine in case of a case of sap disease for 21 days. Emergency prophylaxis with antibiotics (doxycycline) or sulfonamide drugs for 5-10 days. With mandatory serum testing for the presence of antibodies at the end of quarantine.

No specific prophylaxis has been developed. Early detection and veterinary surveillance of sick animals (conjunctival maleic test) is important.

MELIOIDOSIS. Synonyms: pseudo-sap, East Indian sap, pneumoenteritis, morphine septicaemia - a tropical zoonotic bacteriosis that occurs with sepsis and the formation of abscesses in organs and tissues.

ICD-10 codes

A24. Melioidosis

A24.1 Acute melioidosis

A24.2. Subacute and chronic melioidosis

A24.3. Melioidosis, pulmonary, latent, relapsing form

A24.3. Other specified melioidosis

A24.4. Unspecified melioidosis

The causative agent of meloidosis - Burkholderia pseudomallei - belongs to the genus Pseudomonas of the family Pseudomonadaceae. It is a gram-negative, bipolarly coloured rod 2-6 μm long and 0.5-1 μm wide. Aerobic, flagellated, motile, grows well on nutrient media. It does not form capsules or spores. It has two temolabile endotoxins that cause haemorrhagic-necrotic lesions or death of animals in the experiment. The pathogen persists for a long time in the environment. It survives up to 30 days in a humid environment, 24 days in decaying materials, and up to a month or more in water. It is killed by heat and disinfectants. The pathogen is susceptible to levomycetin, tetracycline, kanamycin, and some sulfonamide drugs.

Epidemiology. Melioidosis is endemic in Southeast Asia and Northern Australia, where it is observed in humans and animals. In Europe and the USA, cases of melioidosis are imported.

In regions endemic for melioidosis, the main reservoir of the pathogen in nature is soil and water contaminated with excretions of infected animals. Animals excrete the pathogen in their urine and faeces, and become infected themselves when they consume feed and water. The infection can be observed in many species of animals: rats, mouse-like rodents, rabbits, cows, dogs, cats, kangaroos, etc. Arthropods are not involved in the transmission of the infection. In endemic areas, melioidosis is widespread, as evidenced by the fact that 7-10% of the adult population in these areas have antibodies to the melioidosis pathogen. Human infection can occur through the consumption of contaminated food or water, as well as through aerogenic transmission (airborne dust). Infection often occurs when small skin lesions are contaminated with soil. Human-to-human transmission is extremely rare. A case of sexual transmission of the infection to a patient with chronic prostatitis has been described (the pathogen of melioidosis was detected in the prostate

secretion). Hospital-acquired infection of immunocompromised individuals is possible.

The highest incidence is recorded during the rainy season in agricultural areas and in wartime. Up to 98% of cases are reported in men.

Pathogenesis of melioidosis. The entry point for the infection is minor injuries of the skin or mucous membranes of the digestive or respiratory tract. The pathogen reaches regional lymph nodes by lymphatic route, where it sometimes multiplies with the formation of purulent foci. In septic forms of melioidosis, the pathogen enters the bloodstream and haematogenously spreads to various organs and systems, forming many secondary foci with caseous decay and abscesses, which can increase in size and merge. Most of the foci develop in the lungs, with single abscesses in all other organs and tissues, including bones. Secondary foci consist of a central zone of caseous necrosis surrounded by granulation tissue. Calcifications do not develop. The septic course of melioidosis is observed in severely debilitated individuals. Probably, melioidosis can also occur in the form of a latent infection, when the pathogen persists for a long time in the area of the entrance gate, causing generalisation of the process over a long period of time with a decrease in the immunobiological resistance of the body. After melioidosis, antibodies appear in the blood. Cases of recurrent melioidosis have not been described.

Clinic. The incubation period of melioidosis lasts only 2-14 days (according to laboratory infections from the time of skin damage to the development of the disease).

The main clinical forms:

1) septic (lightning, acute, subacute, chronic);

2) pulmonary (infiltrative, abscessing);

3) latent;

4) recurrent.

The septic form is the most severe. The disease may develop gradually. An inflammatory infiltrate appears at the site of the pathogen's penetration (skin damage), regional lymphadenitis develops, body temperature rises, and soon enough the disease becomes septic. In the majority of patients, the septic form begins

suddenly with chills, high fever, severe headache, and shortness of breath. In some cases, the disease is severe, with repeated vomiting and frequent liquid enteric stools, leading to excoriation, against the background of severe intoxication. An enlarged spleen and liver are often detected, and in some cases, jaundice. Symptoms of cardiovascular insufficiency increase rapidly. This form resembles cholera and septic plague. The patient dies from infectious toxic shock in 2-4 days before secondary septic foci develop (lightning form). In other cases, the primary focus is inflammatory changes in the lungs, from which the infection then spreads haematogenously to various organs and systems. General weakness appears, the temperature with chills rises to 39 °C and above, the patient is disturbed by cough, pleural chest pain, dullness of the percussion sound, and moist wheezing is heard over the affected lungs. The process is more often localised in the upper lobes. Then the severity of the course increases. Multiple pustules appear on the skin and abscesses in the muscles and internal organs. Clinically, it is severe sepsis, which occurs as septicaemia. Only some patients have time to develop certain signs of septicaemia. The disease lasts 8-12 days. In untreated patients, this form is always fatal.

A very rapid development of septic infection is observed in weakened individuals (drug addicts, diabetics, alcoholics, etc.). In these cases, fever and signs of generalised intoxication increase rapidly. At the same time, signs of lung damage and multiple lesions of other organs appear. There is pharyngitis, pustular rash all over the body, loose watery stools, severe shortness of breath, cyanosis. Some patients develop purulent arthritis, meningitis, and impaired consciousness. Lung radiography reveals nodular shadings with a diameter of about 10 mm, prone to coalescing into larger infiltrates. These forms of the disease usually do not respond to therapy.

In subacute and chronic forms of melioidosis, a longer course is noted with the formation of sluggish abscesses in various organs and tissues. A picture of septicaemia develops. Symptoms depend on the localisation of purulent foci. Against the background of a febrile condition, patients quickly lose body weight. These forms

periodically give remissions, but without etiological therapy, patients also die within a month (subacute forms) or in a few months (chronic forms).

The pulmonary form of melioidosis can begin suddenly, but more often this disease develops gradually, sometimes even being detected by accident during X-ray examinations. The main symptoms of this form of melioidosis are fever, cough with purulent, sometimes bloody sputum, increasing weakness, weight loss, and chest pain. Fever is usually irregular or remitting with chills and sweating. A picture of severe pneumonia develops, followed by lung abscesses and purulent pleurisy. Rapid and significant weight loss is characteristic, with decreased appetite and weakness.

Haemogram: neutrophilic leukocytosis, elevated ESR. On X-ray examination, the changes are very similar to those of tuberculosis. The upper lobes are more often affected, in most patients with the formation of thin-walled cavities with a diameter of 1-4 cm. Some patients may have several cavities (2-3 or more). Sometimes the lung lesions occur in the form of infiltrates without caseous decay.

Recurrent melioidosis. The causative agent of melioidosis can persist in the body for a long time in the form of a latent infection, which is detected only during laboratory testing. In cases of immune suppression, the infection is activated in the form of acute septic or pulmonary disease or in the form of chronic localised purulent disease. Relapse develops a long time after the initial infection. A case of relapse 26 years after infection has been described. The possibility of distant recurrence is about 20%. In case of latent form, cases of self-healing are possible.

Complications: lymphadenitis, UTI, liver, spleen, kidney abscess, amyloidosis, fistula.

Diagnosis of melioidosis. The diagnosis is made in a comprehensive manner, taking into account epizootic data, clinical signs, pathological changes and the results of bacteriological tests. An accurate diagnosis is made using the bacteriological method by isolating the pathogen from blood, CSF, synovial fluid, urine, faeces, vomit, sputum, ulcer discharge and abscess contents.

Serological reactions are used (RBC with a specific antigen in a diagnostic titer of 1:8 and above. A negative RBC does not exclude the possibility of

melioidosis; a hemagglutination reaction is more sensitive and early positive at titres of 1:16-1:64).

The bioassay is performed by injecting the material into guinea pigs under the skin (males can be injected into the abdominal cavity), and the animals die on the 10th-20th day (males develop orchitis and peritonitis, and subcutaneous injection causes ulcers at the injection site).

It is differentiated from sap, cholera, septicaemia, plague, malaria, typhoid, staphylococcal infection, pulmonary tuberculosis, systemic mycoses, nonspecific purulent diseases, amoebic liver abscesses.

Treatment: always carried out in a hospital setting under a strict anti-epidemic regime.

Long-term etiotropic therapy is used. The most effective is the use of intravenous ceftazidime or ceftriaxone in combination with tetracycline for 2-3 weeks, followed by oral doxycycline for 2-3 months. Good results have been obtained with parenteral levomycetin succinate for 30 days or more, imipenem, amoxiclav, azlocillin, ticarcillin, aztreonam.

They provide active detoxification and symptomatic therapy, weight loss, and surgical treatment of purulent foci.

Prognosis. Before the introduction of antibiotics, mortality in septic forms was close to 100%, with modern methods of treatment, about 50% or more die in septic forms. In other forms of melioidosis, the prognosis is more favourable. The probability of long-term relapse is about 20%.

Prevention. No specific prevention has been developed. Patients with melioidosis are subject to isolation and hospitalisation. In endemic areas, measures are taken to exterminate rodents and protect food from them. Drinking raw water and bathing in stagnant water bodies is prohibited.

If melioidosis is suspected, the affected animals are isolated and examined bacteriologically. Disinfection, deratisation and disinsection are carried out on the affected farm. Slaughter of sick and suspected animals for meat is prohibited. Patients with the disease require long-term medical supervision due to the possibility of late relapses.

FOOT-AND-MOUTH disease (epidemic stomatitis) is an acute infectious disease of the zoonotic group caused by the Dermaphilus pectoris virus, manifested by intoxication, aphthous lesions of the mucous membrane of the mouth, nose, skin between the fingers and near the nail bed.

ICD-10 code

B08.8. Other specified viral infections characterised by damage to the skin and mucous membranes.

Etiology. The causative agent belongs to the virus of the genus Rhinovirus, family Picornaviridae, which has high virulence, pronounced dermatotropism, and very high variability. It contains RNA, size 8-20 nm. The virus tolerates low temperatures and desiccation. High temperature, UV light, acidic and alkaline

conjunctiva, around the mouth, nasal environments are detrimental to it.

The source of the disease is a foot-and-mouth disease animal, animal products derived from an animal or contaminated with its excretions. Humans become infected with foot-and-mouth disease by eating food contaminated with the virus or by poor hygiene in contact with a sick animal. Infection occurs through damaged mucous membranes of the mouth and nose. The infection is not transmitted from person to person. During epizootics, isolated cases are reported in humans, more often in children and livestock workers. There is a possibility of intra-laboratory infection of people and aerogenic infection when working in a room where animals with FMD were kept. The disease is observed in all countries, mainly in the form of epizootics. Immunity is type-specific and lasts up to 1-1.5 years.

Pathogenesis. The entry gate of the virus is the nasopharyngeal mucosa, less commonly the digestive tract and damaged skin, where it replicates and accumulates due to its pronounced epithelial tropism. The primary lesion develops in the area of primary localisation - specific vesicles. The virus then spreads lymphatically and haematogenously, and disseminates with the formation of numerous secondary lesions on the affected mucous membranes and skin. Virusemia is accompanied by fever and general intoxication. With the development of aphthae, the pathogen disappears from the blood. In severe disease, dystrophic changes occur in the cardiovascular system and central nervous system, kidneys, esophagus, and stomach.

The formation of immunity is associated with cellular mechanisms (involving macrophages, T- and B-lymphocytes) and the production of virus-neutralising antibodies. The virus is eliminated in saliva, urine, and bile.

Clinical course. The incubation period is from 1 to 12 days, most often 3-8 days.

Classification:

Clinical forms: cutaneous, mucosal, cutaneous-mucosal.

Course: acute, protracted.

Severity: erased, mild, moderate, severe.

Complications: pneumonia, sepsis, myocarditis, and rarely meningitis.

The onset of the disease is acute, accompanied by severe chills, headache, muscle pain, loss of appetite, and fever of up to 40 degrees. The fever peaks on day 1-2 and lasts for 5-6 days. After 1-2 days, symptoms of mucosal lesions occur: burning sensation in the mouth, excessive salivation, then small bubbles 1 to 3 mm in size appear on the mucous membrane of the mouth and nose, which subsequently increase, forming erosions. There is a sharp hyperaemia and swelling of the lips, gums, nasopharynx, photophobia, redness of the eyes, often pain when urinating, vomiting, and bowel dysfunction. Vesicles appear on the mucosa, urethra, genitals, skin in the interdigital spaces, phalanges and palms. If treatment was carried out in a timely manner, the disease proceeds without complications, the fever lasts from 3 to 6 days, and all wounds heal. The total duration of the disease is 2 weeks. If the virus enters the body through the gastrointestinal tract, stomatitis may not appear. In this case, the disease proceeds as acute gastroenteritis. Typical symptoms are intoxication, fever, abdominal pain, nausea, vomiting, diarrhoea. Most often, this form manifests itself in children after infection through dairy products. In severe cases, spotted-papular and haemorrhagic rashes appear on the skin of the neck and trunk. Arterial hypotension and bradycardia are typical. Sometimes there is an enlargement of the liver and spleen. In uncomplicated foot-and-mouth disease, internal organs are not affected.

The prolonged course lasts for several months with relapses of vesicular exanthema against the background of a satisfactory general condition. The erased

form presents with mild malaise, moderate headache and vesicles in the interdigital spaces. The inaparanthous form has no clinical manifestations and is diagnosed by the detection of specific antibodies in the blood. Virus carriage can last up to 5-6 months.

Differential diagnosis. Vesicular stomatitis, acute herpetic stomatitis, aphthous stomatitis, chickenpox, drug allergy, erythema exudatum multiforme, enterovirus infection.

Diagnosis:

- clinical symptoms
- epidemiological history
- Epizootological situation in the region
- laboratory tests:

1) Isolation of the virus from vesicles, afters, saliva, blood and faeces in animal kidney culture.

2) serological tests: RHC, RNGA in paired sera with an interval of 6-8 days. Antibody titres increase by the 4th week of the disease.

3) biological test on Guinea pigs, mice, rabbits.

Treatment. Patients are isolated in a hospital for at least 14 days until the acute manifestations disappear. The diet is sparing with semi-liquid food, fractionally 5-6 times a day with the use of large amounts of fluids. Before meals, 0.1 g of anaesthetic is given, and tube feeding is possible. The oropharynx is irrigated with 3% hydrogen peroxide solution, 0.1% potassium permanganate solution, chamomile or sage infusions, and 0.25% novocaine solution.

Etiotropic therapy: local antiviral therapy is used from the first days. Use 0.25-0.5% oxolinic, 0.25-0.5% tebrophenic, 4% heliomycin, 50% interferon ointments. Leukocyte IFN and 0.1-1% RNase solution are used.

Pathogenetic and symptomatic therapy: anti-inflammatory and analgesic drugs are prescribed. In case of eye lesions, sodium sulfacyl solution is used. Ultraviolet light and laser therapy are used to improve epithelialisation.

Detoxification therapy, cardiovascular drugs, vitamins, analgesics, antihistamines. In severe cases - GCS. Antibiotics and sulphonamides are used in case of secondary infection.

Prevention. Foot-and-mouth disease is one of the most dangerous quarantine veterinary infections. The measures regulated by the International Health Standards include early detection and elimination of foot-and-mouth disease epizootics, sanitary control and quarantine during animal transport.

Disinfection is mandatory. Sick animals are destroyed and burned. Healthy animals are vaccinated. A quarantine is imposed for 21 days after the last sick animal is recovered, killed or slaughtered and the final disinfection is carried out.

In endemic areas, it is forbidden to consume dairy products without heat treatment. Meat is subject to industrial processing. In endemic areas, pregnant women, adolescents and people with microtraumas of the hands are not allowed to work on farms.

The laboratories strictly adhere to the anti-epidemic regime.

Systematic sanitary and educational work is carried out among the population.

A DISEASE CAUSED BY A RAT BITE. Synonyms: rat bite disease, rat bite fever, streptobacillosis, Haverhill fever, Sodocu, streptobacillosis) combines two diseases with similar clinical picture caused by Spirochete (Spirillum minus) and Streptobacillus moniliformis. The first of these is called sodoku, the second is called streptobacillosis, Haverhill fever. They are united by a history of rat bite and similar clinical symptoms.

Sodoku

ICD-10 codes

A25. Fever from a rat bite

A25.0. Spirillosis

A25.1. Streptobacillosis

A25.9 Rat bite fever is unspecified.

Etiology. The causative agent is Spirocheta minus (Spirillum minus). It is a short, motile rod (2 to 4 μm long, up to 0.5 μm wide) with 2-3 whorls. It is well stained by Romanowski-Gimza. It does not form spores or capsules. It grows poorly

on nutrient media. It is sensitive to penicillin, tetracycline, macrolides. Pathogenic for rats, white mice, guinea pigs, monkeys.

Epidemiology. The reservoir and source of infection are rats and, less frequently, other animals (weasels, squirrels, rabbits, dogs, gerbils). Among animals, the pathogen is transmitted by bites, eating infected corpses, transplacental transmission and milk. Human infection occurs through contact with rat bites, rarely with other animals, and sometimes through contaminated milk. The disease is not transmitted from person to person. The susceptibility to infection is high, and people who have contact with animals (hunters, veterinarians, etc.) are most often affected. After the disease, type-specific immunity remains. The incidence is sporadic.

Pathogenesis. The pathogen penetrates through damaged skin. At the site of inoculation, the pathogen accumulates and forms a primary lesion, from which spirochetes spread lymphogenically with the formation of lymphangitis and lymphadenitis. Then the pathogen enters the bloodstream, haematogenously enters the organs of the reticuloendothelial system, where it is fixed and causes the re-generalisation of the infectious process (repeated attacks of the disease). Recovery occurs due to the formation of specific immunity and phagocytosis of the pathogen.

Clinic. The incubation period lasts from 3 days to 2 months. During incubation, the wound at the bite site can heal.

The disease begins acutely with a fever of 39-40°C, which persists for 5-7 days, then drops critically with profuse sweating. The attack recurs in 3-7 days. The number of attacks (in the absence of etiological therapy) is from 6 to 20 or more, and the disease can last for several months. At the onset of the disease, simultaneously with the onset of symptoms of intoxication, a primary affect occurs at the bite site, which is first a dense painful infiltrate, on which a blister and then an ulcer form. Lymphangitis and regional lymphadenitis develop. There are chills, fever, adynamia, and muscle pain. Very often, starting from the 2nd or 3rd attack, a spotted-papular, urticular, rarely vesicular, petechial rash appears, affecting the whole body, but with predominant thickening in the area of the primary affect. The rash lasts 3-5 days and disappears without pigmentation. During attacks, patients suffer from severe muscle and joint pain, neuralgia, and sometimes paresthesia. Successive attacks occur in the

absence of primary affect. The prolonged course of the disease exhausts patients, and bacterial infections often occur, which can lead to death.

An abortive course with recovery after the first fever attack is possible. Mortality without antibiotic therapy reaches 10-12%.

Complications: brain abscesses, soft tissue abscesses, polyarthritis, myocarditis, endocarditis, pericarditis, nephritis, bronchopneumonia, sepsis, lesions of the NS.

Differential diagnosis: felinosis, malaria, sepsis, plague, tularemia, rickettsiosis, Lyme disease, meningococcal infection, measles, rubella, infectious mononucleosis, brucellosis, cutaneous anthrax, secondary syphilis, rheumatoid polyarthritis.

Diagnosis.

1. Epidemiological history
2. Clinical picture
3. Detection of spirochetes in a blood smear, from the primary affect discharge, in a smear and a "thick drop" stained by Romanowsky-Giemsa. Blood sampling is recommended at the height of fever. Lysis and agglutination reactions with spirochete and patient's serum can be used starting from day 6-8 of the disease. Specific antibodies in maximum titres are detected 1-3 months after the onset of the first clinical symptoms, persist for 1.5-2 years, then gradually decrease.
4. Biological method: intraperitoneal infection of white mice or guinea pigs.

Treatment. Treatment in a hospital with bed rest.

Etiotropic therapy: benzylpenicillin by mouth in a daily dose of 6-12 million units, doxycycline 0.1 g orally 2 p/day. Macrolides or cephalosporins are also used in general therapeutic doses. The duration of antibiotic therapy is 7-14 days. Fatalities may occur in the absence of timely treatment. Pathogenetic and symptomatic therapy depending on the course of the disease. Follow-up in case of disease complications.

Prevention. No specific prevention has been developed.

Nonspecific includes rat control and compliance with safety rules for contact with rodents.

Emergency prophylaxis for rat bites - doxycycline for 5 days.

STREPTOBACILLOSIS A25.1.

Etiology. The causative agent of Streptobacillus moniliformis is a Gram (+) polymorphic bacillus, unstable in the environment. Requires protein media for growth.

Epidemiology. The mechanisms of infection and clinical presentation are similar to sodoc. However, there are significant differences. Sporadic cases are reported in many countries. Infection occurs through the bite of rodents, including laboratory white rats. Infection is possible when rat blood gets into microtraumas of the skin or mucous membranes. Infection is also possible through water and food (if contaminated with rodent excretions). A sick person does not pose an epidemiological risk.

Pathogenesis. It is poorly studied. It resembles a septic condition with damage to various organs. There are lymphadenitis, septic foci in various organs, streptobacillary pneumonia, abscesses, infarctions of the spleen, kidneys, and brain.

Clinic. The incubation period lasts 3-10 days, sometimes longer. The disease begins acutely, with chills, headache and muscle pain. In 2-3 days, a rash (macules, papules, haemorrhages, sometimes vesicles) appears and quickly disappears on the skin of the extremities, sometimes all over the body. There is often no primary affect. Rashes appear simultaneously, often in the area of individual joints, can spread to the palms and soles, and are accompanied by severe itching. The rash disappears in 3-4 days. Inflammation of the joints, more often of the knees and elbows, is characteristic. The skin over the joints is hyperaemic. Clinical symptoms last for 10 days. In some cases, meningitis, endocarditis, and abscesses occur. The mortality rate is 7-10%.

Complications. Arthritis, myocarditis, endocarditis, pericarditis, soft tissue abscesses, pneumonia, purulent meningitis, persistent diarrhoea, sepsis. Nowadays, they are rare and mainly occur in severe disease, in weakened individuals, and in the elderly.

Diagnostics. Bacteriological examination of blood and synovial fluid,

Serological methods (RA, RCA): maximum antibody titres are observed in 1-3 months; CBC: possible hyperleukocytosis.

Differential diagnosis. Sodocu, yersinia, typhoid fever, malaria, chronic brucellosis, sepsis, leptospirosis, Marseille fever.

Treatment

1. Etiotropic therapy with penicillin and tetracycline drugs, possibly levomycetin, for at least 7 days. Without treatment, the mortality rate reaches 7-10%.
2. Infusion and detoxification therapy.
3. Vitamin therapy.

Medical examination in case of complications of the disease.

Prevention: compliance with sanitary and hygienic rules, disinfection of drinking water, compliance with the rules of cooking, selling and storing products. Comprehensive preventive measures and deratization are carried out. No immunoprophylaxis measures have been developed.

LISTERIOSIS. This is an acute infectious disease, mainly of people with reduced resistance, with various ways of transmission and various clinical manifestations, most often in the form of tonsillitis, polyadenitis, septicaemia, meningoencephalitis.

ICD-10 codes:

A 32. Listeriosis

A 32.0. Cutaneous listeriosis

A 32.1. Listeriosis meningitis and meningoencephalitis.

A 32.7. Listeriosis septicaemia.

A 32.8. Other forms of listeriosis.

A 32.9. Listeriosis is not specified.

Etiology. The causative agent is Listeria monocytogenes - a Gram(+) bacillus 0.5-2.0 μm long and 0.3-0.5 μm wide. It moves slowly due to 1-4 flagella. Does not form spores, may have a capsule. It belongs to facultative anaerobes, is well cultivated on neutral or slightly alkaline meat-peptone media at 37°C. On dense media, it forms small greyish-white colonies (S-form), which lose virulence during

cultivation and turn into rough colonies (R-form). Hemolysin, a lipolytic factor that dissolves macrophages, is released. During decay, endotoxin is released.

The cells contain somatic (O) and flagellar (H) antigens. There are 16 serovars, of which three (1/2b, 1/2a, 4b) cause up to 90% of all cases of listeriosis in humans. There are 9 phagotypes of listeria. Under adverse conditions, listeria form the L-form, which is less virulent. They penetrate macrophages and endothelial cells with the help of the membrane protein internalin. The bacterial haemolysin, listeriolysin O, destroys phagolysosome membranes, which is the main factor of virulence. Bacterial phospholipases help to counteract the antibodies formed. Listeria are quite resistant in the environment, especially to low temperatures and desiccation. They remain in soil and water for years and can multiply. They also multiply in milk and meat at a temperature of 4-6 °C. When boiled, they die in 3-5 minutes. Disinfectant solutions are fatal.

Epidemiology. It belongs to the typical zoonotic infections with natural foci. It has been detected in 42 species of mammals and 22 species of birds. The reservoir in nature is mainly wild rodents (mice, rats, gerbils, squirrels, hares), other mammals (foxes, wolves, wild boars, deer, gazelles) and birds (partridges, grouse, etc.). Domestic rodents, farm animals (often sheep), pets and poultry are infected from wild animals.

In mammals and birds, listeriosis is predominantly latent or asymptomatic. Infected animals excrete the pathogen in urine, faeces, milk, nasal mucus, amniotic fluid, and contaminating the environment. Therefore, the main route of transmission is *alimentary*. Ixodes and gamma ticks, lice, and fleas can spread the infection, but the vector-borne route plays a secondary role.

In healthy people, Listeria has been isolated from the vagina, cervix, nose, ear, blood, urine, and faeces. However, the role of humans in the spread of the infection remains poorly understood.

Humans become infected from animals mainly by eating raw milk, insufficiently thermally processed meat products, eggs, and water. When caring for sick animals, slaughtering them, processing their skin and meat, the *contact route of* infection can be implemented. *Aerogenic infection* cannot be ruled out when cleaning

the premises where animals are kept, processing fur, or agricultural work. Infection through blood-sucking insects can also be assumed (this route has not been proven in humans). *Vertical transmission of* listeria through the placenta or during childbirth by ingestion of amniotic fluid, blood contamination, and vaginal discharge is well known. A case of transmission of Listeria to a child through mother's milk has been described. *Sexual* transmission is also possible.

Of all the population groups, housewives, livestock farmers, veterinarians, workers at meat processing plants and slaughterhouses, and people with immunodeficiency are most likely to be infected. People are infected all year round. The incidence is sporadic. Minor outbreaks are possible. The incidence increases in spring and summer.

Pathogenesis. The pathogen enters the body through mucous membranes and damaged skin. Then, listeria penetrate the regional lymph nodes by lymphatic means, affecting them. After breaking through the lymphatic barrier, the bacteria are haematogenously distributed throughout the body, settling in the parenchymal organs. The occurrence of listeriosis and the severity of the course depends on the resistance of the macroorganism and the infectious dose, as the pathogen has low virulence. Individuals with reduced T-cell function are more likely to get sick. An important role is played by the ability of listeria to stay and multiply intracellularly, in particular in macrophages and granulocytes. It often occurs as a septic infection. Listeria often show a pronounced affinity for nervous tissue, causing the development of meningoencephalitis.

Numerous small foci of inflammation in the form of granulomas (listeriosis) are formed in the tonsils, liver, spleen, adrenal glands, and brain, some of which may become necrotic with the formation of abscesses. General and local changes are largely caused by the action of bacterial endotoxins. Allergic changes occur and immunity is formed. In addition to cellular reactions, specific agglutinins, precipitins and complementary antibodies are detected in the blood. However, post-infectious immunity is weak, and relapses and reinfection are possible. The patient remains a bacterial carrier.

Clinic. The incubation period lasts 2-4 days. There are angio-septic, nervous, ocular glandular, tuff-like and isolated (rare) forms of listeriosis. In addition, there is listeriosis in pregnant women and newborns.

- The angio-septic form occurs more often in adults after nutritional infection.

General intoxication, febrile reactions, tonsillitis (catarrhal, follicular or lacunar, less commonly ulcerative filmy tonsillitis, peritonsillar abscess). On day 5-6 of the disease, a finely spotted or polymorphic rash without a typical localisation may appear. It resembles infectious mononucleosis. The course is severe. In case of sepsis or meningitis, the disease lasts up to 1-2 months.

- The nervous form is more common in children, due to the greater permeability of the BBB and reduced immunological resistance. Meningitis, meningoencephalitis, and less commonly, encephalitis with lesions of individual pons (pairs VII, VIII), psychosis, and arachnoiditis develop.

Purulent meningitis. Generalised intoxication, fever, cramps, paresthesia and hyperesthesia are pronounced. In encephalitis, hallucinations, aggressiveness, and mental automatism are noted. Severe stem encephalitis with a fatal outcome has been described. Convalescents may have paresis and mental disability.

- The ocular glandular form is characterised by the development of unilateral or bilateral conjunctivitis.

The eyelids are swollen. Several superficial follicles with granulomas in the centre (3-5 mm in diameter) appear on the hyperemic conjunctiva. Choroiditis may be involved. Regional lymph nodes are enlarged, dense, painful. Fever, chills, headache, dyspeptic symptoms.

- Typhoid-like form

Prolonged fever, enlarged liver and spleen, rosaceous-papular rash and haemorrhage. Fever is accompanied by intense sweating. Fever (remitting, constant, wave-like) lasts 2-3 weeks. Generalised lymphadenopathy is common. Septic foci occur in various organs (endocarditis, specific abscess pneumonia, purulent pleurisy, polyserositis, hepatitis with jaundice).

- In pregnant women, it occurs latently or in the form of acute respiratory infections, tonsillitis, polyadenitis, pyelonephritis, cystitis, enteritis, meningitis or meningoencephalitis.

Since listeria have a tropism for the uterus and placenta, there is often a high incidence of preeclampsia, miscarriages, abortions, and premature births with the birth of a dead fetus. The amniotic fluid is turbid. Vaginal carriage of listeriosis may persist after listeriosis.

- In newborns, it is more common in the form of granulomatous sepsis or meningitis.

At the onset of the disease in the first week of life, whitish granulomas appear on the mucous membranes, and papules and petechiae on the skin. Severe intoxication (refusal to breastfeed, repeated vomiting, convulsions), inflammatory infiltrates in the lungs, myocarditis, hepatomegaly with jaundice may occur. Complications: hydrocephalus, mental retardation. If the disease occurs at a later stage, the child initially appears healthy, but after 1 month septicaemia or purulent meningitis develops. The mortality rate is high.

- Isolated forms (liquid): listeria pneumonia, endocarditis, hepatitis, urethritis.

Classification:

Clinical forms: angio-septic, nervous (meningitis, meningoencephalitis, polyradiculoneuritis, psychosis), ocular-glandular, glandular, typhoid, endocarditis, septicaemia, listeriosis of pregnant women, fetus and newborn, skin.

Course: acute, subacute, chronic.

Severity: mild, moderate, severe.

Asymptomatic carrier.

Complications: SCI, hydrocephalus, mental retardation.

Diagnosis:

1. Bacteriological examination (nasal and oropharyngeal mucus, eye discharge, blood, CSF, lymph node puncture; in parturients - pieces of placenta, amniotic fluid, vaginal discharge; in newborns - blood from the umbilical cord, meconium; sectional material - brain, liver, spleen) - sowing on agar and nutrient

broth (glucose-glycerol-serum or glucose-liver-meat). It is rarely possible to isolate Listeria by the direct method.

2. Biological study on white mice. Animals die in 2-6 days.

3. Conjunctival test on guinea pigs. When a daily broth culture is administered, purulent conjunctivitis develops after 2-3 days.

4. Serological reactions. In the second week of the disease, antibodies are detected in RA (diagnostic titer 1:400-1:800) and RNGA (1:80), and later in RBC (1:5-1:10). With recovery, the titres decrease rapidly.

5. PCR.

6. In the clinical picture of encephalitis, CT and MRI are used (to detect focal changes, including abscesses).

Differential diagnosis:

- Angina-septic form: tonsillitis, diphtheria, infectious mononucleosis, staphylococcal sepsis.
- Ocular glandular form: tularemia, blennorrhoeic conjunctivitis.
- Nervous form: tuberculosis and other bacterial meningitis and meningoencephalitis.
- Typhoid form: typhoid fever, paratyphoid fever, sepsis.
- In pregnant women: brucellosis, toxoplasmosis, CMV infection.
- Viral hepatitis, epidemic mumps, ornithosis, chickenpox, syphilis.

Treatment. Patients with severe disease and pregnant women are hospitalised. Bed rest, good nutrition, physical and mental rest are indicated.

Etiotropic therapy is prescribed as early as possible - the antibiotics of choice are ampicillin and benzylpenicillin. Trimethoprim-sulfomethoxazole, vancomycin, carbopenem may be prescribed; in case of endocarditis, ampicillin with aminoglycosides is prescribed. High doses are prescribed (except for pregnant women). The duration of therapy for meningoencephalitis is 21 days, for brainstem lesions, brain abscess and endocarditis - 6 weeks. Cephalosporins and chloramphenicol are not effective.

Pathogenetic and symptomatic therapy: detoxification, cardiovascular, antihistamines, analgesics. In severe cases, prednisolone 20-40 mg per day for 5-7

consecutive days is prescribed. Topical therapy (rinsing the mouth with antiseptics, in case of ocular-glandular form - 30% sodium sulfacyl, 0.5% hydrocortisone solution). Aloe, cyclopherone, donor Ig, multivitamins are used to stimulate defences, regeneration and metabolic processes. The overall mortality rate is 20-30%, in immunodeficiency states it reaches 30-50%.

Prevention. Prevention and elimination of listeriosis in farm animals (quarantine of animals for a month, avoid contact with wild animals). Deratization, catching stray dogs and cats, disinfestation. Carrying out anti-epizootic and anti-epidemic measures in listeriosis-affected farms.

It is important to exclude the alimentary route of infection - personal hygiene, processing of vegetables and fruits, pasteurisation of milk.

Persons from risk groups in the epidemic focus are indicated to eradicate Listeria colonisation with ampicillin or trimethoprim-sulfamethoxazole for 5-7 days. Women with a complicated obstetric history should be screened for listeriosis. No specific prophylaxis has been developed.

II. CLINICAL PARASITOLOGY AND TROPICAL MEDICINE. DISEASES CAUSED BY VIRUSES AND CONTROLLED BY IHR

Arboviral infections. Features of the clinical course. Hemorrhagic fevers: Ebola, Lassa, Marburg, dengue, chikungunya, South American haemorrhagic fevers. Phlebotomy fever. Encephalitis: California, Venezuelan, American equine, Japanese, Rift Valley. The concept of relapsing typhus

ARBOVIRAL INFECTIONS (an acronym from the Latin arthropoda and the English word borne) are a group of viruses that are transmitted to vertebrates (including humans) through the bite of blood-sucking insects (mosquitoes, ticks, fleas, lice, bedbugs)

Classification

1. Family Togaviridae
2. Family Flavivivridae
3. Family Bunyaviridae
4. Family Rhabdoviridae
5. Family Arenaviridae
6. Family Reoviridae

Clinically, arboviral infections manifest as fever of unclear genesis, CNS lesions (encephalitis), and haemorrhagic fevers.

DENGUE FEVER is a viral disease transmitted by mosquitoes that has been spreading rapidly in all WHO regions in recent years. Dengue is widespread in the tropics, with local differences in risk largely dependent on rainfall, temperature and natural rapid urbanisation.

Severe dengue was first recognised in the 1950s during dengue epidemics in the Philippines and Thailand. There are 4 different but closely related serotypes of the virus that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4). After recovering from an infection caused by one of these serotypes, lifelong immunity to that particular serotype is established. However, cross-immunity to other serotypes after recovery is

only partial and temporary. Subsequent infections with other serotypes increase the risk of severe dengue.

Epidemiology. According to a recent estimate, 390 million people are infected with dengue annually (95% confidence interval 284-528 million), of whom 96 million (67-136 million) have clinical manifestations (of any severity). Another study on the prevalence of dengue estimated that 3.9 billion people in 128 countries are at risk of dengue virus infection. It is estimated that 500,000 people with severe dengue require hospitalisation each year, of whom 2.5% die. Between 2010 and 2016, due to significant improvements in patient management by strengthening the capacity of countries, a 28% reduction in the mortality rate was recorded worldwide.

Mechanism and route of transmission. The main vectors are Aedes aegypti mosquitoes. The virus is transmitted to humans through the bites of infected female mosquitoes. After an incubation period of 4-10 days, an infected mosquito is able to transmit the virus throughout its remaining life.

Infected humans are the main carriers of the viruses and contribute to their reproduction by being a source of viruses for uninfected mosquitoes. Patients already infected with dengue virus can transmit the infection (within 4-5 days; maximum 12 days) via Aedes mosquitoes after the first symptoms of the disease. Aedes albopictus, the second most important vector of dengue in Asia, has spread to North America and more than 25 countries in the European region. Ae. Albopictus are easily adaptable to new environments and can therefore survive in colder areas of Europe.

Clinic. A high fever (40°C/104°F) is accompanied by two of the following symptoms: severe headache, pain behind the eyes, muscle and joint pain, nausea, vomiting, swollen lymph nodes or a rash.

Severe dengue is a potentially fatal complication associated with plasma leakage, fluid accumulation, respiratory failure, severe bleeding, or organ damage.

Warning signs appear 3-7 days after the first symptoms, along with a fever (below 38°C/100°F), and include severe abdominal pain, uncontrollable vomiting, rapid breathing, bleeding gums, fatigue, agitation and the presence of blood in the vomit.

The next 24-48 hours of this critical stage can be fatal; proper medical care is needed to prevent complications and death.

Diagnosis. The following methods are used to confirm the diagnosis: Isolation of the virus and serological identification; test material - blood, serum, tissue. PCR; test material: blood, plasma, serum, tissue. Antigen detection; test material: serum or tissue. ELISA for IgM detection; test material: blood, plasma, serum. Test turnaround time: 30 minutes (rapid orientation tests) to 7-14 days (final confirmation).

Treatment. There is no specific treatment for dengue fever. In cases of severe dengue, medical care by doctors and nurses with expertise in the manifestations and development of the disease can help save lives and reduce mortality rates from more than 20% to less than 1%. In the treatment of severe dengue, it is critical to maintain the patient's body fluids at an adequate level.

Vaccination. The first dengue vaccine, Dengvaxia® (CYD-TDV), was licensed in December 2015 and has now been approved by regulatory authorities in 20 countries for use in people aged 9-45 years in endemic areas. The analysis demonstrated that a subset of study participants who were likely to be seronegative at the time of their first vaccination were at increased risk of more severe dengue and hospitalisation as a result of the disease compared to unvaccinated participants.

Clinical trials have shown that the live attenuated dengue vaccine CYD-TDV is effective and safe for people who have previously been infected with dengue virus (seropositive patients), but is associated with an increased risk of severe dengue in those who are exposed to natural dengue infection for the first time after vaccination (seronegative patients).

Prevention and control. Currently, the only way to control or prevent dengue transmission is to control mosquito vectors through the following measures Preventing mosquitoes from accessing egg-laying sites; proper disposal of solid waste and destruction of artificial, human-made habitats; storing household water supplies in closed containers and emptying and washing them weekly; using appropriate insecticides for water containers stored outdoors; and using personal protective equipment, mosquito nets, long-sleeved clothing, and insecticide-treated

materials; Improving community participation and mobilisation for sustainable vector control; during outbreaks, emergency vector control measures may also include the use of insecticide sprays; active vector monitoring and surveillance should be conducted to determine the effectiveness of vector control measures.

EBOLA FEVER. The Ebola virus causes an acute severe illness that is often fatal if left untreated. Ebola Virus Disease (EVD) first emerged in 1976 during 2 simultaneous outbreaks in Nzara (now South Sudan) and Yambuku, Democratic Republic of Congo. The second outbreak occurred in a village next to the Ebola River, from which the disease takes its name.

The 2014-2016 outbreak in West Africa is the largest and most complex Ebola outbreak since the virus was discovered in 1976. More people have become ill and died in this outbreak than in all other outbreaks combined. It is also spreading between countries, having started in Guinea and spread across land borders in Sierra Leone and Liberia.

Five types of Ebola have been identified: Zaire, Bundibugio, Sudan, Reston and Tai Forrest. The first three of them - Ebola viruses Bundibugio, Zaire and Sudan - are associated with major outbreaks in Africa. The virus that caused the outbreak in West Africa in 2014-2016 belongs to the Zaire species.

Mechanism of transmission. The natural hosts of the Ebola virus are fruit bats of the Pteropodidae family. Ebola enters the human population through close contact with the blood, secretions, organs or other body fluids of infected animals, such as chimpanzees, gorillas, fruit bats, monkeys, forest antelopes and porcupines found dead or sick in humid forests.

Ebola is then spread by person-to-person transmission through close contact (through damaged skin or mucous membranes) with the blood, secretions, organs or other body fluids of infected people, as well as with surfaces and materials (e.g. bedding, clothing) contaminated with such fluids. Healthcare workers often become infected when providing care to patients with suspected or confirmed EVD, as a result of close contact with patients and insufficiently strict infection control practices. Funeral rites, which include direct contact with the body of the deceased,

can also contribute to the transmission of the Ebola virus. People remain contagious as long as the virus is in their bodies.

Clinic. The incubation period is from 2 to 21 days. People are not contagious before the onset of symptoms. The first symptoms are: sudden onset of fever, muscle aches, headache, sore throat.

This is followed by vomiting, diarrhoea, rash, kidney and liver dysfunction and, in some cases, both internal and external bleeding (e.g., blood from the gums, blood in the stool).

Laboratory tests reveal low levels of white blood cells and platelets along with elevated liver enzymes.

Virus carriage in people after EVD: Ebola virus is known to persist in immunocompromised parts of the body of some people who have had Ebola virus disease. These parts of the body include the testes, the inside of the eyes and the central nervous system. In women who are infected during pregnancy, the virus persists in the placenta, amniotic fluid and embryo. In women infected while breastfeeding, the virus can persist in breast milk. The recurrence of symptoms in any person who has had CWD due to increased viral replication in a particular part of the body has been documented, although it is a rare phenomenon. The causes of this phenomenon are not fully understood.

Diagnosis. It can be difficult to distinguish EVD from other infectious diseases, such as malaria, typhoid fever and meningitis. To confirm that symptoms are caused by Ebola virus, the following tests are performed: enzyme-linked immunosorbent assay with antibody capture (ELISA); antigen detection tests; serum neutralisation reaction; reverse transcriptase polymerase chain reaction (RT-PCR); electron microscopy; and virus isolation in cell cultures.

When selecting diagnostic tests, technical specifications, disease incidence and prevalence rates, and the social and health consequences of test results should be taken into account. Diagnostic tests that have been independently and internationally evaluated are strongly recommended for use.

The tests currently recommended by the WHO include the following:

- Automated and semi-automated nucleic acid amplification tests (NAT) for routine diagnostics.
- Rapid antigen detection tests for use in remote areas without access to NAT. These tests are recommended for screening purposes as a component of surveillance, but reactive tests should be confirmed by NAT.

Specimens taken from patients pose an extremely high biological hazard; laboratory testing of uninactivated specimens should be carried out under conditions of maximum biological isolation. During national and international transport, all biological specimens should be placed in triple-packaging systems.

Treatment. Supportive care with oral or intravenous fluids and treatment of specific symptoms improves survival. There is no proven treatment for CJD yet. However, a number of potential treatments are currently being evaluated, including blood products, immune and drug therapies**.**

Vaccination. An experimental vaccine against the Ebola virus has demonstrated a high preventive effect against this deadly virus in a large-scale trial in Guinea. The vaccine, called rVSV-ZEBOV, was tested in 2015 in a trial involving 11,841 people. Among the 5,837 people who received the vaccine, no cases of Ebola were reported 10 days or more after vaccination. At the same time, 23 cases were reported among those who did not receive the vaccine 10 days or more after vaccination.

Prevention. Reducing the transmission of CWD is achieved by:

- reduce the risk of transmission of infection from wild animals to humans. Animals should be handled with gloves and other appropriate protective clothing. Their products (blood and meat) should be subjected to thorough heat treatment before being eaten.
- reduce the risk of person-to-person transmission of infection through direct or close contact with people with symptoms of CWD, especially with their body fluids. When caring for patients at home, gloves and appropriate personal protective equipment should be worn. Hands should be washed regularly after visiting patients in hospitals and caring for patients at home.

- Reducing the risk of possible sexual transmission - as this risk cannot be ruled out, men and women who have recovered from Ebola should abstain for at least three months after the onset of symptoms.

Infection control in healthcare facilities. Healthcare workers should always follow standard precautions when caring for patients, regardless of the intended diagnosis. These include basic hand hygiene, respiratory hygiene, the use of personal protective equipment (to protect themselves from splashing or otherwise coming into contact with infected materials), safe injections, and safe burial of the dead.

Healthcare workers caring for patients with suspected or confirmed Ebola virus infection should take additional infection control measures to prevent contact with the patient's blood and body fluids, as well as contaminated surfaces or materials such as clothing and bedding. When in close contact (within one metre) with a CEVD patient, healthcare workers should protect their face (with a face shield or medical mask and goggles) and wear a clean, non-sterile, long-sleeved gown and gloves (sterile gloves for some procedures).

Laboratory workers are also at risk. Specimens taken from humans and animals for the diagnosis of Ebola infection should be handled by trained personnel in properly equipped laboratories.

LASSA HAEMORRHAGIC FEVER. Epidemiology. People usually become infected with Lassa virus through contact with urine or faeces of infected Mastomys rats. Lassa virus can also be transmitted from person to person through direct contact with the blood, urine, faeces or other secretions of a person infected with Lassa fever. There is no epidemiological evidence of airborne transmission of Lassa virus from person to person.

Person-to-person transmission occurs both in communities and in healthcare facilities through the use of contaminated medical equipment, in particular through the reuse of needles. There is evidence of sexual transmission of Lassa virus.

People living in rural areas, where Mastomys rats are commonly found, are most at risk. Healthcare workers who provide care to patients with Lassa fever in the absence of appropriate barrier care and infection control practices are at risk.

Clinic. The incubation period is from 6 to 21 days. Early symptoms of the disease: fever, general weakness and malaise. A few days later, headache, sore throat, muscle pain, chest pain, nausea, vomiting, diarrhoea, cough and abdominal pain may occur.

In severe forms of the disease, swelling of the face, fluid in the lung sinuses, bleeding from the mouth, nose, vagina or gastrointestinal tract may develop. Later, shock, convulsions, tremors, disorientation and coma may occur.

Deafness develops in 25% of cured patients. In half of these patients, partial hearing recovery occurs in 1-3 months. During the recovery period, temporary hair loss and gait disturbances may occur.

In fatal cases, death usually occurs within 14 days of the onset of symptoms. The disease is particularly severe in the later stages of pregnancy, with maternal mortality and/or fetal loss rates exceeding 80% during the last trimester.

Diagnosis. Due to the diverse and non-specific symptoms of Lassa fever, clinical diagnosis, especially in the early stages of the disease, is often difficult. Lassa fever is difficult to distinguish from other viral haemorrhagic fevers.

A definitive diagnosis of infection caused by Lassa virus can only be made in a laboratory using the following tests: Enzyme-linked immunosorbent assay (ELISA), antigen detection tests, reverse transcription polymerase chain reaction (RT-PCR), and isolation of the virus by cell culture.

Treatment and vaccination. In the early stages of the disease, which manifests itself clinically, the antiviral drug ribavirin is considered to be an effective treatment for Lassa fever. There is no information on the efficacy of ribavirin as a post-exposure prophylaxis against Lassa fever.

To date, there is no vaccine against Lassa fever.

Prevention and control of the disease. Prevention of Lassa fever is based on good hygiene at the community level to prevent rodents from entering homes, storing grain and other food in containers that are inaccessible to rodents, removing waste disposal sites from dwellings, keeping homes clean and keeping cats. Since the population of Mastomys in endemic areas is very large, their complete eradication is

not possible. Family members should always take precautions to prevent contact with blood and bodily fluids when caring for sick people.

Healthcare workers who provide care to patients with suspected or confirmed Lassa fever should take additional infection control measures to prevent contact with patients' blood and bodily fluids, as well as with infected surfaces or materials. When in close contact with patients with Lassa fever (within one metre), healthcare workers need face protection (face shield or medical mask and goggles), a clean, non-sterile long-sleeved gown and gloves.

Laboratory workers are also at risk. Specimens taken from humans and animals for the purpose of investigating Lassa virus infection should be handled by trained personnel, and the research should be carried out in laboratories with maximum biosecurity.

CHIKUNGUNYA FEVER. It is transmitted by mosquitoes. Chikungunya virus disease was first described during an outbreak in southern Tanzania in 1952. Its causative agent is an RNA virus belonging to the genus alphavirus from the togavirus family. The name "chikungunya" comes from a Kimakonde verb meaning "to become contorted", which corresponds to the appearance of hunched people suffering from joint pain.

Epidemiology. Chikungunya is distributed in Africa, Asia and the Indian subcontinent. For a number of years, the level of human infection in Africa has remained relatively low, but a major outbreak occurred in the Democratic Republic of the Congo in 1999-2000 and in Gabon in 2007.

Since 2016, there have been a total of 349,936 presumptive and 146,914 laboratory-confirmed cases. The highest number of cases was reported in Brazil (265,000 presumptive cases), Bolivia and Colombia (19,000 presumptive cases each). Since 2016, local transmission of chikungunya has been reported for the first time in Argentina following an outbreak with more than 1,000 suspected cases.

In the Africa region, an outbreak of chikungunya was reported in Kenya, with more than 700 suspected cases. In 2017, Pakistan continued to take measures to respond to the outbreak that began in 2016.

Transmission mechanism. The virus is transmitted from person to person through the bites of infected female mosquitoes. The disease is mainly transmitted by two species of mosquitoes, Aedes aegypti and Aedes albopictus, which can also transmit other viruses, including dengue. These mosquitoes can bite people throughout the daylight hours, but are most active in the early morning and late afternoon. Both mosquito species bite people outdoors, while Ae. Aegypti - indoors. Symptoms usually appear 4-8 days after an infected mosquito bites a person, but this period can be from 2 to 12 days.

Clinic. Chikungunya is characterised by sudden fever, often accompanied by joint pain. Other common signs and symptoms include muscle and headache, nausea, fatigue, and rash. The joint pain is often very severe, but usually goes away after a few days or weeks.

In most cases, patients recover completely, but in some cases, joint pain can last for several months or even years. Some cases of ocular, neurological and cardiac complications, as well as gastrointestinal disorders have been reported. Serious complications are rare, but the disease can be fatal in the elderly. The disease often presents with mild symptoms and the infection may not be detected or misdiagnosed in areas where dengue is prevalent.

Diagnosis. Serological tests, such as enzyme-linked immunosorbent assay (ELISA), can confirm the presence of IgM and IgG antibodies to chikungunya virus. The highest levels of IgM antibodies are reached 3-5 weeks after the onset of the disease and persist for approximately two months.

Specimens collected within the first week of symptom onset should be tested by both serological and virological methods (PCR). Different reverse transcriptase polymerase chain reaction (RT-PCR) methods are available, but the sensitivity of these methods varies. Some of them are suitable for clinical diagnosis.

The PCR products obtained from clinical samples can also be used for virus genotyping, which allows comparison of virus samples from different geographical areas.

Treatment. There are no specific antiviral drugs for the treatment of chikungunya. Treatment is mainly aimed at relieving symptoms, including joint pain, with antipyretics (except aspirin), optimal painkillers and fluids.

Prevention. Prevention and control of the disease is based on reducing the number of natural and artificial water-filled containers that provide habitat and breeding grounds for mosquitoes. During outbreaks of the disease, insecticides can be sprayed to kill flying mosquitoes, surfaces inside and around containers where mosquitoes land can be treated, and water in containers can be treated to kill immature larvae.

To protect yourself during chikungunya outbreaks, it is recommended to wear clothing that covers your skin as much as possible against mosquito bites during the daytime. Exposed skin or clothing can be sprayed with repellents in strict accordance with the instructions contained in the annotations. Repellents should contain DEET, IR3535 or icaridin. Mosquito spirals and other insecticide sprays can also help protect against mosquito bites indoors.

RIFT VALLEY FEVER (RVF) is a viral zoonosis that primarily affects animals but can also infect humans. Infection can lead to severe disease in both animals and humans. The disease also results in significant economic losses due to deaths and abortions amongst PRRS-infected livestock.

The PRRS virus is a member of the phlebovirus genus. It was first discovered in 1931 during an investigation of an epidemic among sheep on a farm in the Rift Valley, Kenya.

Epidemiology. Most human infections occur as a result of direct or indirect contact with the blood or organs of infected animals.

There is some evidence of the possibility of human infection with BSE when consuming unpasteurised or raw milk from infected animals.

Humans can also be infected by the bites of infected mosquitoes, most commonly Aedes and Culex mosquitoes; transmission of the LRV virus by haematophages (blood-feeding flies) is also possible.

To date, no cases of human-to-human transmission of HRV have been reported. There have also been no reports of transmission of HRV to healthcare workers under standard infection control measures.

Clinic.

A mild form of HRV in humans: The incubation period of EVD lasts from 2 to 6 days. Infected people either do not have any detectable symptoms or develop a mild form of the disease, characterised by a febrile syndrome with a sudden onset of flu-like fever, muscle aches, joint pain and headache. Some patients develop neck stiffness (immobility), photosensitivity, loss of appetite and vomiting; in such patients, the disease in its early stages can be mistaken for meningitis. Typically, symptoms of WRV last from four to seven days, after which they can be detected by the body's immune response, which is manifested in the appearance of antibodies and the disappearance of the virus from the blood.

Severe human LRV: While most human cases are relatively mild, a small proportion of patients develop a much more severe form of the disease. It is usually accompanied by one or more of three distinct syndromes: eye disease (0.5-2% of patients), meningoencephalitis (less than 1%) or haemorrhagic fever (less than 1%).

Ocular form: in this form of the disease, the usual symptoms characteristic of the mild form of the disease are accompanied by damage to the retina. Typically, eye damage occurs one to three weeks after the first symptoms appear. Patients usually complain of blurred or blurred vision. After 10-12 weeks, the disease can go away on its own without any long-term consequences. However, with macular lesions, 50% of patients experience permanent vision loss. Death among patients with the ocular form of the disease alone is rare.

Meningoencephalitis: The onset of meningoencephalitis usually occurs one to four weeks after the first symptoms of WNV. Clinical symptoms include severe headache, memory loss, hallucinations, confusion, disorientation, dizziness, seizures, lethargy and coma. Later (more than 60 days), neurological complications may occur. The mortality rate among patients with this form of the disease alone is low, but residual neurological deficits, which can be severe, are common.

Hemorrhagic form: Symptoms of this form of the disease appear two to four days after the onset of the disease. First, there are signs of severe liver damage, such as jaundice, followed by signs of haemorrhage, such as vomiting blood, blood in the faeces, a red rash or bruising (caused by skin haemorrhage), nose and gum bleeding, menorrhagia and bleeding from venipuncture sites. Mortality among patients who develop the haemorrhagic form of the disease reaches approximately 50%. Death usually occurs three to six days after the onset of symptoms. The virus can be detected in the blood of patients with HRV in the form of haemorrhagic jaundice within 10 days.

Diagnosis. Rift Valley fever can be difficult to distinguish from other viral haemorrhagic fevers, as well as from many other diseases that cause fever, including malaria, shigellosis, typhoid fever and yellow fever.

The final diagnosis of infection caused by Rift Valley fever virus can only be made in the laboratory using the following tests: reverse transcription polymerase chain reaction (RT-PCR); immunosorbent assay using fixed enzymes to detect IgG and IgM antibodies; isolation of the virus in cell cultures.

Treatment. Given that most cases of people with LRV disease are relatively mild and short-lived, no special treatment is required for these patients. In more severe cases, general supportive care is the preferred treatment.

Vaccination. An inactivated vaccine has been developed for use in humans. However, this vaccine is not licensed and is not commercially available. It is being used for experimental purposes to protect veterinarians and laboratory workers at high risk of infection with PRRS. Other candidate vaccines are being tested.

Prevention. Outbreaks of PRRS in animals can be prevented by sustainable animal vaccination programmes. To prevent epizootics, animals should be immunised before an outbreak occurs. If an outbreak has already occurred, vaccination CANNOT be carried out as there is a high risk of an outbreak intensifying.Restricting or banning the movement of livestock can be effective in slowing the spread of the virus from infected to uninfected areas. Good hand hygiene, gloves and other appropriate protective clothing should be worn and safety precautions should be taken when handling sick animals or their tissues and when slaughtering animals. In

areas affected by epizootics, all products of animal origin (blood, meat and milk) must be thoroughly cooked before consumption. The importance of using mosquito bite protection at the individual and community level, which should include the use of insecticide-impregnated mosquito nets and, if available, individual repellents, wearing light-coloured clothing (long-sleeved shirts and trousers), and avoiding outdoor activities during the peak vector activity season.

Although no cases of human-to-human transmission of EVD have been identified, there is still a theoretical risk of transmission from infected patients to healthcare workers through contact with infected blood or tissue. Healthcare workers caring for patients with suspected or confirmed EVD should follow standard precautions when handling specimens from these patients.

Standard precautions are recommended for the care and treatment of all patients. They apply to the handling of blood (including dried blood) and all other body fluids,

MARBURG HAEMORRHAGIC FEVER (MHF) was discovered in 1967 after outbreaks in Marburg and Frankfurt (Germany). The mortality rate is 88%. The EVD virus is a member of the Filoviridae, just like the Ebola virus.

Epidemiology. Countries in which AMR has been reported: Angola, DR Congo, Germany, Kenya, Serbia, South Africa, Uganda, and the United Republic of Tanzania.

Primary human infection occurs after prolonged exposure to mines or caves inhabited by colonies of Rousettus aegyptiacus bats. The second carrier of the virus is African green monkeys (Cercopithecus aethiops). Pigs have also been shown to be susceptible to the virus, and are therefore considered as potential host animals during outbreaks. Transmission occurs primarily from person to person through close contact with blood, secretions, organs or other bodily fluids of infected people. Transmission of infection to healthcare workers in the treatment of AML patients has been reported as a result of close contact in the absence of appropriate infection control measures.

Clinic. The incubation period is from 2 to 21 days.

Initial symptoms: high fever, severe headache, malaise, cortical rash. On the 3rd day - diarrhoea, abdominal pain and cramps, nausea, vomiting. On the 5th-7th

day - haemorrhagic syndrome, which is manifested by bleeding from the nose, intestines, uterus. The central nervous system is affected - confusion, aggressiveness. In severe cases, death occurs on the 8-9th day.

Diagnosis. Differential diagnosis is carried out with malaria, typhoid fever, shigellosis, cholera, plague.

The final diagnosis can only be made based on the results of laboratory tests, namely: enzyme-linked immunosorbent assay (ELISA); antigen detection tests; serum neutralisation reaction; reverse transcriptase polymerase chain reaction (RT-PCR); and isolation of the virus in cell cultures.

Treatment and vaccination. In severe cases of the disease, symptomatic therapy is necessary due to the fact that patients often need intravenous infusions or oral rehydration with solutions containing electrolytes.

To date, there is no specific treatment or vaccine for AML. A number of candidate vaccines are being tested, but they may not become available for several years. Laboratory studies of new drug therapies are showing encouraging results and are currently being evaluated.

Prevention. Reducing the risk of transmission of infection from bats to humans as a result of prolonged exposure to mines or caves where colonies of fruit-eating bats live.

Reducing the risk of human-to-human transmission in local communities through direct or close contact with infected patients. Close physical contact with patients with AML should be avoided. When caring for sick people at home, gloves and personal protective equipment should be worn. Wash your hands regularly after visiting sick relatives in hospitals and after caring for sick people at home. Inform the local population about the dangers of WNV. People who die of Marburg fever should be buried quickly and safely.

CALIFORNIA ENCEPHALITIS. The California encephalitis virus (CEV) is a member of the Bunyaviridae family. Genetic information is stored on single-stranded RNA. The size of the virus is 90-100 nm in diameter.

Epidemiology. Natural circulation of WNV occurs between *Aedes triseriatus* mosquitoes and vertebrates (chipmunks and squirrels). A person can get this virus after a mosquito bite. This can lead to clinical manifestations or viral carriage.

Clinic. The incubation period of VCI is 5-15 days.

Initial symptoms: fever, headache, nausea and vomiting, malaise, depression. Epilepsy is common during the disease, but not often. In most cases, there is a full recovery. Less commonly, after recovery, epileptic seizures, hemiparesis, and cognitive impairment are observed.

Diagnosis. To confirm the diagnosis, cerebrospinal fluid and serum are tested for the presence of specific IgM to EBV and neutralising antibodies. In fatal cases, nucleic acid amplification, immunohistochemistry, and viral culture on autopsy tissue may be used for confirmation. All tests are performed by specialised and accredited laboratories. Results are available within 4-14 days.

Treatment. No specific treatment for WNV has been developed. Patients are admitted to hospital for symptomatic treatment. No specific vaccine has been developed.

Prevention. The most effective way to prevent an EVD infection is to prevent mosquito bites. Use insect repellent, wear long-sleeved shirts and trousers, treat clothing and equipment, and take steps to control mosquitoes indoors and outdoors.

VENEZUELAN ENCEPHALITIS. Venezuelan encephalitis virus (VEE) is a member of *the Togaviridae* family. Genetic information is stored on single-stranded RNA. The size of the virus is 60-65 nm in diameter. Endemic areas: North America, Caribbean (group I); Central and Southern Africa (groups IIa, IIb, III).

Epidemiology. Natural circulation of WNV occurs between *Culiseta melanura* mosquitoes and birds in deciduous tree swamps. Transmission to humans requires mosquito species that can create a "bridge" between infected birds and uninfected mammals, such as some species of *Aedes*, *Coquillettidia* and *Culex*. Horses are just as susceptible to the virus as humans. However, they are not a source of infection for humans.

Clinic. The incubation period is 4-10 days. There are 3 clinical forms of the disease: systemic infection, carriage or encephalitis. The systemic infection has a

sudden onset and is characterised by chills, fever, malaise, arthralgia and myalgia. The disease lasts from 1 to 2 weeks and ends with recovery when there is no CNS damage. In young children, the encephalitis form of the disease is characterised by an abrupt onset.

In older children and adults, encephalitis manifests itself after several days of systemic illness. Signs and symptoms in patients with encephalitis include fever, headache, irritability, anxiety, drowsiness, anorexia, vomiting, diarrhoea, cyanosis, convulsions, and coma.

Diagnosis. To confirm the diagnosis, cerebrospinal fluid and serum are tested for the presence of specific IgM to EBV and neutralising antibodies. In fatal cases, nucleic acid amplification, immunohistochemistry, and viral culture on autopsy tissue may be used to confirm the diagnosis. All tests are performed by specialised and accredited laboratories. Results are available within 4-14 days.

Treatment. There is no specific treatment for EBV. Patients are admitted to hospital for symptomatic treatment. No specific vaccine has been developed.

Prevention. The most effective way to prevent an EVD infection is to prevent mosquito bites. Use insect repellent, wear long-sleeved shirts and trousers, treat clothing and equipment, and take steps to control mosquitoes indoors and outdoors.

AMERICAN ENCEPHALITIS. The American encephalitis virus (AEV) belongs to the family *Flaviviridae*. Genetic information is stored on single-stranded RNA. The size of the virus is 40 nm in diameter.

Epidemiology. Natural circulation of WNV occurs between *Culex* mosquitoes and wild birds. Occasionally, WNV infects domestic birds. Transmission to humans requires mosquito species that can create a "bridge" between infected birds and uninfected mammals, such as some species of *Cx pipiens*, *Cx quinquefasciatus* and *Cx nigripalpus*.

Clinic. The incubation period is 5-15 days. The onset of the disease is usually abrupt, with fever, headache, dizziness, nausea and malaise. Signs and symptoms increase over several days to a week. Some patients recover spontaneously after this period; others develop signs of a CNS infection, including neck stiffness, confusion,

disorientation, dizziness, tremors and unsteadiness. Coma can develop in severe cases.

The disease is generally milder in children than in adults. Around 40% of children and young adults with VAE develop only fever and headache or aseptic meningitis; almost 90% of older people with VAE develop encephalitis.

The overall mortality rate is between 5 and 15%. The risk of fatal disease also increases with age.

Diagnosis. To confirm the diagnosis, cerebrospinal fluid and serum are used for the presence of specific IgM to EBV and neutralising antibodies. In fatal cases, nucleic acid amplification, immunohistochemistry, and viral culture on autopsy tissue may be used for confirmation. All tests are performed by specialised and accredited laboratories. Results are available within 4-14 days.

Treatment. No specific treatment for VAE has been developed. Patients are admitted to hospital for symptomatic treatment. No specific vaccine has been developed.

Prevention. The most effective way to prevent VAE infection is to prevent mosquito bites. Use insect repellent, wear long-sleeved shirts and trousers, treat clothing and equipment, and take steps to control mosquitoes indoors and outdoors.

JAPANESE ENCEPHALITIS. Japanese encephalitis virus (JEE) belongs to the family *Flaviviridae*. Genetic information is stored on single-stranded RNA. The size of the virus is 15-22 nm in diameter.

Epidemiology. Natural circulation of WNV occurs between *Culex tritaeniorhynchus* mosquitoes and pigs and birds. Transmission of WNV occurs primarily in rural agricultural areas, often associated with rice production and flooding. In some parts of Asia, these conditions can occur near urban centres. In temperate areas of Asia, the transmission of VEE is seasonal. Human disease usually peaks in summer and autumn. In the subtropics and tropics, transmission can occur year-round, often peaking during the rainy season.

Clinic. The incubation period is 5-15 days. Less than 1% of people infected with WNV develop clinical illness. Initial symptoms often include fever, headache, and vomiting. Changes in mental status, neurological symptoms, weakness and

movement disorders may develop over the next few days. Epileptic seizures are common, especially in children.

Diagnosis. To confirm the diagnosis, cerebrospinal fluid and serum are used for the presence of specific IgM to WNV and neutralising antibodies. In fatal cases, nucleic acid amplification, immunohistochemistry, and viral culture on autopsy tissue may be used to confirm the diagnosis. All tests are performed by specialised and accredited laboratories. Results are available within 4-14 days.

Treatment. There is no specific treatment for VJD. Patients are admitted to hospital for symptomatic treatment.

Vaccination. Licensed inactivated vaccine against VNV. It can be used from the age of 2 years. Vaccination is carried out in 2 doses according to the schedule: 0-28 days. The last dose is given at least 1 week before travelling. Revaccination is performed in 1 year. People planning to travel to an endemic area for more than 1 month should be vaccinated. People travelling to an endemic area for less than 1 month can be vaccinated. Vaccination is not recommended for travellers with a short stay in an endemic area.

Prevention. The most effective way to prevent an EVD infection is to prevent mosquito bites. Use insect repellent, wear long-sleeved shirts and trousers, treat clothing and equipment, and take steps to control mosquitoes indoors and outdoors.

Peculiarities of rickettsiosis: Rocky Mountain spotted fever, tsutsugamushi, endemic typhus, tick-borne typhus of North Asia. Q - fever. Bartonellosis. Yerlichiosis

ROCKY MOUNTAIN SPOTTED FEVER is an acute endemic rickettsial disease characterised by a generalised intoxication syndrome, fever, exanthema and damage to the nervous and cardiovascular systems.

Etiology. The causative agent of the infection - **Rickettsia rickettsii - is** an intracellular parasite characterised by polymorphism, often having a rod-shaped or lanceolate form. The pathogen is cultivated on the yolk sacs of chicken embryos and by infecting laboratory animals.

Epidemiology. Rocky Mountain spotted fever is a vector-borne zoonosis with natural focal point. The main reservoir is *wild rodents*, rarely *domestic animals* (dogs, cattle). The carrier of infection is Ixodes ticks, transovarial transmission. Mechanism of transmission - transmissible through the bite of infected ticks. Seasonality - *spring and summer* (maximum vector activity).

Pathogenesis. The entrance gate of infection is the bite site, where rickettsiae are initially accumulated, but there is no primary effect. Then, the pathogen enters the bloodstream through the lymphatic system, and parasitemia develops with damage to target cells: vascular endothelium and muscle fibre mesothelium.

In the affected endothelium, swelling and proliferation, cellular infiltration and necrosis with the formation of parietal thrombi are observed. There is perivascular proliferation with the formation of specific cellular infiltrates consisting of macrophages, lymphatic and plasma cells with the appearance of destructive or destructive-proliferative thrombovasculitis. A thromb-haemorrhagic syndrome develops.

The most pronounced endothelial changes are observed in the myocardium, brain, lungs, adrenal glands, and skin. In severe cases, obturative forms of

necrotizing panarteritis are formed, which lead to ischaemic lesions of organs and systems, primarily the brain and myocardium.

Clinical picture. The incubation period **is** 3-14 days. The disease is characterised by: sudden onset, less often prodromal phenomena for 1-2 days in the form of symptoms of general intoxication; fever from febrile figures to hyperthermia for 2-3 weeks; severe intoxication syndrome with symptoms of toxic CNS damage; 3-4 days (less often 5-6 days), appearance of a spotted rash, which changes to maculopapular rash, localised on the extremities, face, scalp, palms and soles, and to a lesser extent on the abdomen and face. After regression of the rash, a bran-like peeling remains; thrombhemorrhagic syndrome - bleeding, haemorrhagic rash - petechiae throughout the body, which merge to form necrotic areas (fingertips, earlobes, scrotum). After regression, pigmentation remains; enanthema on the conjunctiva and soft palate, tongue; arterial hypertension, bradycardia (tachycardia - severe); hepatosplenomegaly; constipation; kidney damage with proteinuria.

Complications. Pneumonia, phlebitis, nephritis, myocarditis, CNS lesions in the form of hemiplegia, neuritis, visual impairment, deafness, obliterative endarteritis.

Diagnosis. *Serological methods:* RNIF (recommended by WHO); RA with OH_{19} and OH_2 proteins; RHC with a specific antigen (from 2 weeks of the disease); PH. *Biological method* - infection of laboratory animals (males) with the development of scrotal necrosis.

Treatment. *Etiotropic therapy:* tetracycline 1.2-2.0 g/day up to 3 days of normal temperature, levomycetin 2.0 g/day up to 3 days of normal temperature

NORTH ASIAN TICK-BORNE TYPHUS is an acute rickettsial disease characterised by a benign course with primary affect, regional lymphadenitis and polymorphic rash.

Etiology. The causative agent of infection ***is Rickettsia sibirica,*** an intracellular parasite that lives in the cytoplasm and nucleus of affected cells

Epidemiology. Tick-borne typhus of North Asia is a vector-borne zoonosis with natural foci.The main reservoir is wild rodents. The carrier of infection is ixodid ticks, transovarial transmission. Mechanism of transmission - transmissible through the bite of infected ticks. Seasonality - spring-summer, September (maximum vector activity).

Pathogenesis. The entry point of the infection is the bite site, where rickettsiae initially accumulate with the development of primary affect. Then, the pathogen enters the bloodstream through the lymphatic system, causing lymphangitis and regional lymphadenitis, and parasitemia develops with damage to target cells: the vascular endothelium. Massive proliferation of rickettsiae occurs in the vascular endothelium, which leads to intoxication, decreased vascular tone, and reactive allergic reactions.

Clinical picture: incubation period - 2-7 days with the formation of primary affect (skin infiltration and compaction with necrosis or ulceration in the centre, covered with a brown crust) and regional lymphadenitis.It is characterized by sudden onset, persistent fever from febrile to hyperthermia for 1-2 weeks, hyperaemia, puffiness of the face, injection of sclerae and conjunctiva, and on days 2-5 (rarely on day 6), abundant polymorphic (rosacea, papules, spots) rash localised on the lateral surface of the trunk, flexural surfaces of the arms, inner thighs, face, neck and buttocks - not draining, on unchanged skin. After regression, pigmentation or bran-like peeling of the skin, symptoms of toxic CNS damage: headache, insomnia, rarely agitation, arterial hypotension, bradycardia (tachycardia - severe), hepatosplenomegaly.

Complications. They are rare and are caused by concomitant pathology or secondary bacterial infection.

Diagnosis. *Serological methods:* ELISA; RPC with specific antigen (from the 2nd week of the disease) 1:40-1:160, RNGA 1:200. *Biological method* - infection of laboratory animals.

Treatment. *Etiotropic therapy:* tetracycline 0.3-0.4 g 4 times/day up to 2 days of normal temperature, doxycycline 0.2 g/day up to 2 days of normal temperature, levomycetin 0.5-0.75 g 4 times/day 2 days of normal temperature

TSUTSUGAMUSHI FEVER is an acute rickettsial disease characterised by the presence of primary affect, lymphadenopathy and maculopapular rash.

Etiology. The causative agent of the infection *is Rickettsia tsutsugamushi (R. orientalis*), an intracellular parasite of polymorphic form (cocci, rods, diplococci), which parasitises only in the cytoplasm of affected cells.

Epidemiology. vector-borne zoonosis with natural foci.

The main reservoir is *ticks of the genus Trombidiidae,* an additional reservoir is *small rodents, marsupials, insectivores*. Transmission agent - *ticks of the genus Trombidiidae*, transovarian transmission. Mechanism of transmission - transmissible through the bite of infected ticks. Seasonality - *spring-summer, September* (maximum vector activity).

Pathogenesis. The entrance gate of infection is the bite site, where rickettsiae initially accumulate with the development of primary affect. Then, the pathogen enters the bloodstream through the lymphatic system, causing lymphangitis, regional or generalised lymphadenitis, and parasitemia develops with damage to target cells: the vascular endothelium. Massive proliferation of rickettsiae occurs in the vascular endothelium, which causes endothelial desquamation with the formation of wall thrombi, intoxication, and severe allergic reorganisation of the body.

Clinical picture. Incubation period - 7-20 days, formation of primary affect (skin infiltration and induration with necrosis or ulceration in the centre, covered with a scab, painless) and regional lymphadenitis. It is characterised by sudden onset with chills, persistent or remitting fever from febrile figures to hyperthermia for 3-4 weeks, severe intoxication, pharyngitis, tracheobronchitis, pneumonia, and hyperaemia, puffiness of the face, neck, catarrhal syndrome in the mouth and pharynx, injection of sclerae and conjunctiva with haemorrhages, haemorrhagic

conjunctival enanthema of the Chiari Avtsin type, regional lymphadenitis with the development of generalised lymphadenopathy, on the 4th-7th day, a profuse polymorphic rash (spots, rosettes, papules) localised on the chest and abdomen, spreading to the trunk and extremities, possible skin peeling and pigmentation in the presence of a haemorrhagic exanthema, symptoms of toxic CNS damage (severe forms), development of encephalitis, delirium tremens, arterial hypotension, bradycardia (tachycardia - severe), hepatosplenomegaly.

Complications. Encephalitis, pneumonia, hepatitis, nephritis, myocarditis, vascular thrombosis.

Diagnosis. *Serological methods:* RNIF, RA (Weil-Felix) 1:80-1:160 (from the 2nd week of the disease), RPC (from the 2nd week of the disease) 1:20-1:80. *Biological method* - infection of laboratory animals.

Treatment. *Etiotropic therapy:* tetracycline 0.3-0.4 g 4 times/day up to 2-3 days of normal temperature, levomycetin 0.5-0.75 g 4 times/day for 2 days of normal temperature.

Q FEVER is an acute natural-focal disease characterised by damage to the mononuclear phagocyte system, polymorphism of the clinical picture with a subacute or chronic course.

Etiology. The causative agent of **Coxiella burneti** infection is an intracellular parasite of polymorphic form (cocci, bacilli), parasitises in target cells with the formation of specific vacuoles, and forms a spore-like form outside the cells. The pathogen is cultivated on cell cultures, chicken embryos, and ticks.

Epidemiology. The source and main reservoir are *small wild mammals, small and cattle, and cargo*. Additional reservoirs are *birds* and *ticks.*

Transmission: *ticks*, transovarial transmission. Mechanisms of transmission: transmissible through the bite of infected ticks, rarely ticks, fleas; aerosol (in places where infected animals are kept, handling of contaminated raw materials); contact (slaughter of livestock, during calving or lambing); faecal-oral (waterway,

nutritional (milk and dairy products that are not heat-treated, meat), contact and household).

Pathogenesis: The pathogen enters the body by various routes, penetrates the lymphatic system and then enters the systemic bloodstream with the development of parasitemia. Some coxsackieviruses parasitise the cells of the mononuclear phagocyte system (reticulocytes and macrophages), where they actively multiply, while others affect parenchymal organs.

Clinical picture. The incubation period is 3-32 days. It is characterized by sudden onset with severe symptoms of general intoxication, fever from febrile figures to hyperthermia with chills and profuse sweating for 2 weeks, facial hyperaemia, scleral vascular injection, catarrhal syndrome in the oropharynx, tongue covered with grey-white plaque, myocarditis, bronchitis, pneumonia (scarcity of physical findings, involvement of mediastinal lymph nodes and sometimes pleura), abdominal pain of various localisations, paroxysmal, caused by impaired autonomic bowel inertia, arterial hypotension, bradycardia, hepatosplenomegaly, very rarely exanthema (rosacea) in combination with arthralgia.

Complications. Secondary bacterial infection - pneumonia, pleurisy, lung abscess, pyelonephritis, thrombophlebitis, pancreatitis, orchitis.

Diagnosis. *Serological methods:* WBC (from the 2nd week of the disease) 1:32-1:256, ELISA - IgM (from the 7th to the 30th day of the disease), IgG, RNIF, RA. *Biological method* - infection of laboratory animals.

Treatment. *Etiotropic therapy:* tetracycline 2 g/day for up to 7-10 days, or 0.1 g 3 times/day parenterally for 2-3 days followed by oral administration; fluoroquinolones (ofloxacin, ciprofloxacin); rifampicin.

EHRLICHIOSIS is a group of acute vector-borne diseases manifested by fever and generalised intoxication, exanthema and specific blood cell damage.

Etiology. Pathogens belong to the class Rickettsiales, family Anaplasmataceae. They are gram-negative, non-motile intracellular parasites, do

not form spores. Among the diversity of Ehrlichiae, at least 4 are currently pathogenic for humans: E. chaffeensis and E. muris - causative agents of monocytic ehrlichiosis; Anaplasma phagocytophilum - causative agent of granulocytic anaplasmosis; E. sennetsu - causative agent of sennets fever.

Ehrlichiae infect mainly leukocyte cells and are found in the cytoplasmic vacuoles of affected cells. The pathogen is cultivated in cell cultures and in white mice.

Epidemiology. The source and main reservoir for monocytic and granulocytic ehrlichiosis are *small wild mammals, small and cattle, cargo*, and an additional reservoir is *birds* and *ticks.* The infection is transmitted by ticks, transovarial transmission. Transmission mechanisms: vector-borne through the bite of infected ticks, less commonly ticks, fleas; aerosol (in places where infected animals are kept, handling of contaminated raw materials); contact (slaughter of livestock, during calving or lambing); faecal-oral (water, nutritional (milk and dairy products that are not heat-treated, meat), household contact).

Pathogenesis. The pathogen enters the body by various routes, penetrates the lymphatic system and then enters the systemic bloodstream with the development of parasitemia. Part of the pathogen parasitises the cells of the mononuclear phagocyte system (reticulocytes and macrophages), where it actively multiplies, while another part affects parenchymal organs. The vascular endothelium is damaged, followed by impaired vascular permeability with the development of haemorrhagic syndrome in the parenchymal organs and skin. The causative agent of monocytic ehrlichiosis E. Chaffeensis can penetrate the blood-brain barrier, causing meningitis.

Clinical picture

The incubation period is 1-21 days. Characteristic is a sudden onset with severe symptoms of generalised intoxication, fever from febrile figures to hyperthermia with chills and profuse sweating for more than 2 weeks, facial flushing, scleral vascular injection, catarrhal syndrome in the oropharynx, tongue covered with grey-white plaque, myocarditis, bronchitis, pneumonia (scarcity of

physical findings, involvement of mediastinal lymph nodes and sometimes pleura), abdominal pain of various localisations, paroxysmal, caused by impaired autonomic inertia of the intestine, arterial hypotension, bradycardia, hepatosplenomegaly, very rarely exanthema (rosacea) in combination with arthralgia.

Complications. Secondary bacterial infection - pneumonia, pleurisy, lung abscess, pyelonephritis, thrombophlebitis, pancreatitis, orchitis. Internal combustion engine syndrome. Acute renal failure.

Diagnosis. *Parasitoscopy (acute phase):* thick blood drop, Romanowski-Gimza stain, detection of pathogens in macrophage and monocyte vacuoles. *Serological methods:* WBC (from the 2nd week of the disease) 1:32-1:256, ELISA - IgM (from the 7th to the 30th day of the disease), IgG, RNIF 1:64-1:80 (fever period up to 1 year), immunoblotting, PCR. *Biological method* - infection of laboratory animals.

Treatment. *Etiotropic therapy:* tetracycline 2 g/day for up to 7-10 days; doxycycline 0.1 g twice/day for the first day, then 0.1 g/day for 7-10 days; levomycetin succinate; fluoroquinolones (ofloxacin, ciprofloxacin); rifampicin.

BARTONELLOSIS is a group of infectious diseases of humans and animals characterised by polymorphism of clinical manifestations, development of acute and chronic forms.

Bartenellosis includes:

- Disease from cat scratches
- Systemic bartonellosis
- Cutaneous and mucocutaneous bartonellosis
- Other bartonellosis
- Bartonellosis unspecified
- Trench fever

Etiology. Bartonellosis pathogens belong to the genus Bartonella. They are aerobic haematophages, look like short pleomorphic rods. They do not form spores

or capsules. Some species have jutes or pili. They have a membrane with surface proteins on its surface and a three-layered shell.

Stained by Romanowski-Gimza, in pathological examination of tissue biopsies - by silvering. The culture medium is chocolate agar.

Epidemiology. The main reservoir for B. bacilliformis is humans. The mechanism of transmission is vector-borne. The vector is mosquitoes of the genus Lutzomia.

For V. quintana, the main reservoir is humans. The mechanism of transmission is transmissible. The vector is a clothes louse. For B. Henselae, B. clarridgeiae the main reservoir is cats. The mechanism of transmission is contact. For other Bartonellae, the main reservoir can be cats, dogs, rodents, ticks. The most common mechanism of transmission is vector-borne through flea and tick bites.

Pathogenesis.

Disease from cat scratches

Immunocompetent patients: the pathogen penetrates the skin or mucous membranes with subsequent multiplication and accumulation, resulting in a primary effect in the form of a local reaction. The bacteria then enter the lymphatic vessels, where regional lymphadenitis develops.

Immunocompromised patients: the pathogen penetrates the skin or mucous membranes with subsequent multiplication and accumulation, resulting in a primary effect in the form of a local reaction. Then the bacteria penetrate the lymphatic and blood vessels, hematogenous and lymphogenous dissemination occurs, resulting in polyadenopathy and damage to parenchymal organs.

Oroya fever and trench fever

There is no primary affect. The primary accumulation and multiplication of the pathogen occurs in the skin. Subsequently, the bacteria penetrate the lymphatic and blood vessels, and haematogenous and lymphogenous dissemination occurs. Bartonellae have tropism to the endothelium of the microcirculatory vessels, damaging it, resulting in circulatory disorders and hypoxia, which are clinically

manifested by a generalised intoxication syndrome. Re-entry of Bartonella into the bloodstream leads to red blood cell damage and inhibition of leukocyte apoptosis.

Chronic forms of bartonellosis

It develops in immunocompromised patients. Due to the intracellular localisation of most pathogens, prolonged bacteremia is observed

Bartonellosis caused by V. Henselae and V. quintana

The pathogen damages the endothelium of microcirculatory vessels, causing endothelial cell proliferation and angioproliferation (in immunocompromised individuals), resulting in the growth of granulation tissue.

At the same time, V. Henselae affects mainly the skin, lymphatic system of the liver and spleen, while V. quintana affects the skin, subcutaneous tissue and bone tissue.

Carrion's disease is caused by B. bacilliformis and manifests itself as an acute form (Oroya fever) and chronic (Peruvian wart).

Acute form (Oroya fever): incubation period - 10-21 days, gradual onset with fever from subfebrile to febrile figures, which subsequently rises to hyperthermia, fever is accompanied by symptoms of intoxication, chills, profuse sweating, haemorrhagic syndrome on the skin, polyadenopathy, hepatosplenomegaly, anaemic syndrome (pale skin, weakness, shortness of breath), significant decrease in haemoglobin and erythrocytes by 20-30%.

Chronic form (Peruvian wart) - develops 1-6 months after the acute form, rash: red-purple macules - papules - nodules on the skin, subcutaneous tissue, conjunctiva, mucous membranes, recurrent fever, haemorrhagic syndrome, anaemic syndrome in the blood.

Trench (Volyn) fever is caused by V. quintana.

The incubation period is 10-30 days. It is characterised by an acute onset with fever from febrile to hyperthermia, which lasts up to 5 days and is accompanied by chills and symptoms of general intoxication. Fever of two waves, conjunctival injection, rosaceous or macular rash, hepatosplenomegaly, anaemic syndrome.

Feline scratch disease (benign lymphoreticulosis) is caused by B. Henselae and B. clarridgeiae. The incubation period is from 3 to 60 days. *Typical manifestations:* formation of a primary lesion at the site of scratches or bites in the form of an ulcer or pustule, regional lymphadenitis, fever and symptoms of intoxication. *Atypical oculoglandular variant (Parino syndrome):* infection occurs through the conjunctiva, unilateral conjunctivitis, parotid lymphadenitis, severe fever and symptoms of intoxication, development of red-yellow nodules on the conjunctiva of the eyelids.

Neurological variant: most often develops after the typical and atypical variants. It occurs in the form of meningitis, meningoencephalitis, encephalomyelitis, encephalopathy, mental status changes, severe cephalgic syndrome, fever, positive meningeal signs, and less commonly, seizures and focal symptoms. *Systemic variant:* lung damage (pneumonia, bronchitis, abscess), liver damage (granulomatous hepatitis), spleen damage (abscess), kidney damage (glomerulonephritis), joint damage (arthritis), bone disorders (osteomyelitis, osteitis, periostitis), prolonged fever, lymphadenopathy, hepatosplenomegaly, haemolytic anaemia, thrombocytopenic or nonthrombocytopenic purpura, weight loss.

Bacillary angiomatosis is a rapidly progressive disease characterised by proliferative vascular lesions involving many organs and systems. *The cutaneous variant is characterised by* fever, generalised intoxication syndrome, exanthema in the form of a red-violet papule that grows to a node or rises on a pedicle above the skin surface. Over time, erosion with a haemorrhagic crust or necrosis forms on the surface; the nodules can also be located subcutaneously, single or grouped, and can corrode the skin and become infected. *Bone variant* - fever, generalised intoxication syndrome, primarily long tubular bones are affected, but any bone tissue can be involved in the pathological process, as well as bone marrow, lesions are painful, hepatosplenomegaly and thrombocytopenia in bone marrow involvement.

Gastrointestinal variant - fever, generalised intoxication, gastric, intestinal, oral or anal mucosal lesions, regional lymphadenopathy. *Respiratory variant* - fever,

generalised intoxication syndrome, tracheal and bronchial lesions, regional lymphadenitis or generalised lymphadenopathy. *Neurological variant* - fever, generalised intoxication, brain, cranial nerves or peripheral nerves.

Bacillary peliosis. The pathogen leads to the formation of multiple cysts filled with blood. It develops mainly in the system of macrophage phagocytes in the liver, spleen, abdominal lymph nodes, bone marrow, kidneys, adrenal glands, pancreas, lungs, and gastrointestinal tract with the development of dysfunction of the respective organs.

Chronic bacteremia. Most often it is asymptomatic with a negative bacteriological blood test. In some patients, it manifests itself as fever and symptoms of intoxication with exanthema, lymphadenopathy, hepatosplenomegaly, changes in the haemogram in the form of leukocytosis, thrombocytopenia.

Septic endocarditis. It is most often asymptomatic. In some patients, it develops gradually and is characterised by typical clinical and echocardiographic changes that are typical of heart valve disease of other bacterial etiologies.

Diagnosis. Biopsy with histological examination of the affected organs and systems. Serological methods: ELISA (detection of antibodies to Bartonella), ELISA (detection of antibodies in blood serum or cerebrospinal fluid). Culture method. The optimal method is the isolation of Bartonella from blood, rarely from other infected tissues, using a nutrient medium - chocolate agar. PCR with detection of Bartonella DNA.

Treatment. Etiotropic therapy: azithromycin (in case of significant lymphadenopathy), doxycycline, gentamicin, rifampicin.

Infectious diseases included in the list of events, that may constitute a public health emergency on an international scale and fall within the scope of the International Health Regulations 2005. Pneumonic plague, yellow fever, West Nile fever

The relevance of studying this topic lies in the fact that plague and contagious haemorrhagic fevers occur in areas where there are natural foci of these infections. These are mainly the African continent, the Americas and Asia. Having gained independence, Ukraine has expanded its ties with many countries around the world, and the threat of importing highly dangerous infections (EDI) has increased significantly. Unfortunately, the factor of the possible use of bacteriological weapons, which mainly include EIDs and quarantine agents, has not yet been removed.

Particularly dangerous (quarantine) infections are a group of diseases that are subject to quarantine measures in accordance with international health regulations. This group includes plague, cholera, and contagious viral haemorrhagic fevers. The importance of studying these diseases is due to the presence of some quarantine infectious diseases in Ukraine (Congo-Crimean fever), as well as the possibility of importing OVD into Ukraine.

Plague is a particularly dangerous, acute, naturally occurring, zooanthroponotic bacterial infection with multiple routes of transmission, characterised by a febrile-intoxication syndrome with predominant damage to the lymph nodes, lungs and other organs.

Etiology. The causative agent of the plague is Yersinia pestis, a gram-negative bacillus, spore-forming, non-motile, bipolar, grows well but slowly on simple nutrient media; its growth optimum is 28 °C. It has 3 biotypes: antigua, orientalis, mediaevalis. The pathogen is a facultative intracellular parasite. The high virulence of the plague pathogen is determined by V and W antigens, which provide resistance to intracellular phagocytic destruction. Pathogenicity factors include endo- and exotoxins, a number of enzymes: hyaluronidase, coagulase, haemolysin, fibrinolysin, and others.

Epidemiology. Plague is a naturally occurring focal zoonotic anthropogenic disease. There are natural ("wild plague") and anthropurgic foci of plague. Natural foci occupy about 8% of the world's land area. Active enzootic foci remain in Southeast Asia. The main source of "wild plague" is rodents, gophers, voles, marmots, gerbils, tarbans, etc. In addition to natural foci of plague, anthropogenic (urban, port) plague foci can form. The main source of infection in anthropic foci is black and grey rats, cats, camels and other animals. Humans can be an additional source of infection.

The infection can be transmitted to a healthy person in various ways: vector-borne, contact, nutritional, and airborne.

Human susceptibility to plague is very high. The incidence rate is close to one.

Pathogenesis. The ability of the pathogen to suppress the phagocytic activity of neutrophils and macrophages with the development of the phenomenon of incomplete phagocytosis is important, which complicates the launch of the immune response. The disease is accompanied by severe toxinemia. The toxins affect the central nervous system, causing severe neurotoxicosis, and the cardiovascular system with the development of acute cardiovascular failure. They cause disturbances in the haemostatic system with the development of thrombo-haemorrhagic syndrome.

Clinical manifestations. Clinical manifestations include localised and generalised forms. Localised forms include: cutaneous, bubonic and cutaneous-bubonic. Generalised forms include: primary and secondary septic forms; primary and secondary pulmonary forms.

The incubation period lasts from several hours to 6 days. In vaccinated individuals, the incubation period is extended to 10 days. In all forms, the disease begins acutely. Patients can indicate not only the day but also the hour of the disease onset. Body temperature with severe chills, rising to 39.5 - 40 °C or more. Headache, dizziness, musculoskeletal pain, weakness, and sometimes vomiting are typical. Appearance of the patient: the face is flushed, puffy. In the most severe cases, cyanosis of the face occurs, facial features become sharpened, and an expression of fear, hopelessness, and horror ("plague mask") appears. The

conjunctiva and sclera are injected, and there are often pinpoint haemorrhages on the transitional fold. The tongue is dry, thickened, trembling, covered with a thick white coating ("chalky"), the mucous membranes of the oropharynx are hyperemic. From the first days of the disease, signs of central nervous system and cardiovascular system damage appear. Some patients develop agitation, frightening hallucinations, impaired coordination of movements ("drunken gait"), and muscle tremors. Others have lethargy, deafness. Shortness of breath. The boundaries of the heart are dilated, heart sounds are deaf. Tachycardia up to 120 - 140 per minute, pulse arrhythmia, progressive drop in blood pressure.

In the cutaneous form of plague, a spot first appears at the site of the pathogen's penetration, followed by a papule, vesicle, and pustule filled with serous and haemorrhagic contents. The pustule is located on a solid red-purple base and is characterised by significant pain. When the pustule is opened, an ulcer is formed, the bottom of which is covered with a dark scab. Ulcers heal slowly, forming a scar.

In the tambourine form, there are no local skin lesions. The most common are inguinal buboes. The first sign of a tubercle is the appearance of severe pain and local tenderness in the area where the tubercle forms. Because of the pain, patients take a forced position (bent leg, arm outstretched). In 2-3 days, the bubo is formed. The tubercle is painful with fuzzy contours, a dense conglomerate of several nodes fused to the subcutaneous tissue, and inactive. The skin over the tubercle is purple-red, cyanotic. The size of the tubercle can reach 10 cm. Lymphangitis is not observed. At the end of the tubercle formation stage, the phase of its resolution begins. On the 6-8th day, the bubo is opened, and thick pus containing plague pathogens is discharged. Large ulcers may form at the site of the buboes. Healing is slow. After opening the buboes, the general condition of patients improves. Antibiotics are prescribed to prevent suppuration. The tubercle either resolves or scleroses. Especially dangerous are inguinal buboes, as in these cases secondary pulmonary plague often develops.

The initially septic form of plague is extremely severe. The incubation period can be reduced to 2 days. In most patients, on the first day of illness, signs of

cardiovascular failure begin to progress, oliguria, anuria, and thrombohemorrhagic syndrome rapidly develop. Against the background of severe toxicosis, large, confluent purple-black haemorrhages ("black death") appear on the skin. Hemorrhages on the mucous membranes. Nosebleeds. Cases of recovery are extremely rare. The clinic of the secondary-septic form is similar, but develops against the background of the bubonic form.

The primary pulmonary form of plague is also extremely severe. Against the background of neurotoxicosis, on the first day of illness, there is a stabbing pain in the chest, cough, and severe shortness of breath. At the beginning, the sputum is clear, viscous, glassy, on the 2nd day it becomes liquid, foamy, bloody and, finally, bloody. The act of breathing involves the work of the auxiliary muscles, the wings of the nose. Breathing becomes harsh. The physical findings are very poor and do not correspond to the serious condition of the patients. There is a slight shortening of the sound over the affected lobe, and rales. Interstitial and alveolar pulmonary edema develops, which is based on toxic damage to the lung capillaries with a sharp increase in their permeability. The sputum contains a huge number of plague bacilli. In the absence of adequate etiological therapy, patients die within 3-4 days from cardiovascular and respiratory failure. The clinical picture of secondary pulmonary plague, which complicates the course of the bubonic form of the disease, is similar, but a sudden deterioration occurs several days after the onset of the disease. The course of the disease is more favourable compared to that of the primary pulmonary form.

Plague in vaccinated individuals is characterised by a prolonged incubation period of up to 10 days. Fever is subfebrile, symptoms of intoxication are not pronounced. The tambourine is small, very painful, but without pronounced manifestations of periadenitis. In the absence of timely adequate therapy in the first 3-4 days, further development of the disease will not differ from that of unvaccinated patients.

Laboratory diagnostics. The most important are bacteriological and bacterioscopic methods of examination. The causative agent can be isolated from the bubonic point, skin elements, blood, sputum, as well as from cadaveric material

(pieces of internal organs, blood, bone marrow, etc.). Laboratories should work in accordance with the instructions on the mode of operation of anti-plague institutions. The detection of typical bipolar bacteria during bacterioscopy within 1 hour allows for a preliminary diagnosis of plague. It takes 5-7 days to obtain a pure culture and identify it.

The biological test method increases the likelihood of isolating the plague microbe. Guinea pigs and white mice are used. Among the serological methods used are RPC, RIGA, and REMA.

Differential diagnosis. The pulmonary form of plague is differentiated from croup pneumonia. Particularly difficult to diagnose are cases of croup pneumonia when, instead of rusty sputum, little changed blood is produced during coughing. In croup pneumonia, there is no epidemiological history characteristic of plague (staying in plague foci), no pronounced percussion and auscultatory objective findings. Signs of neurotoxicosis in plague pneumonia are more pronounced and occur much earlier.

Complications. Infectious toxic shock, acute cardiovascular failure, acute respiratory failure.

Treatment. At the pre-hospital stage, patients with severe intoxication should receive emergency care. All drugs should be administered against the background of infusion therapy (lactosol, rheopolyglucin, etc.). Corticosteroids are administered at the rate of prednisolone of at least 5 mg/kg of patient weight.

Etiotropic treatment includes the administration of antibiotics. The drugs of choice are aminoglycosides (streptomycin, gentamicin), levomycetin (chloramphenicol), tetracycline drugs and fluoroquinolones (ciprofloxacin, ofloxacin). Depending on the clinical form of plague, streptomycin is prescribed at a dose of 2 to 4.5 g per day (in localised forms, 1 g every 12 hours, in generalised forms, 1.5 g every 8 hours). The administration of large doses of bacteriological drugs can lead to massive bacteriolysis and the development of endotoxic shock. Etiotropic therapy should be started with intravenous administration of a bacteriostatic antibiotic - chloramphenicol. Levomycetin is prescribed in a daily dose of 6 g with a dose reduction after temperature normalisation. Tetracycline is

prescribed in a daily dose of 4-6 g per day. Ciprofloxacin in the bubonic form - 0.5 g orally every 12 hours, in generalised forms - 0.4 g every 12 hours intravenously. The course of antibiotic therapy is 7-10 days.

Along with antibacterial treatment, detoxification therapy is carried out. Crystalloid and colloidal solutions are used in a ratio of 3:1. The daily volume of fluid should be at least 40 mg/kg body weight. Glucocorticosteroids. According to indications, anti-shock therapy, correction of respiratory failure, DIC syndrome, control of pulmonary edema, cerebral edema and swelling are performed.

Prevention. Preventive measures are aimed at preventing the importation of the infectious agent from abroad, reducing the epizootic activity of natural foci and preventing human disease in these foci. According to epidemiological indications, preventive vaccination is carried out in plague foci, primarily for people at high risk of infection (geologists, shepherds, employees of anti-plague institutions). It is necessary to constantly conduct sanitary and educational work among the population. These measures are stipulated by the special International Sanitary Regulations and the Rules for the Sanitary Protection of the Territory. If plague patients are detected, an emergency anti-epidemic commission is created, which imposes quarantine and draws up a comprehensive plan for the elimination of the outbreak.

Measures in the epidemic centre

I. Measures for patients. Patients with plague are subject to mandatory hospitalisation in a plague hospital. Convalescents are discharged after full clinical recovery. Patients with the bubonic form of plague are discharged no earlier than 4 weeks from the date of clinical recovery after a 2-fold negative result of bacteriological examination of the bubonic puncture. Patients with the generalised form are discharged no earlier than 6 weeks from the date of clinical recovery after multiple negative results of sputum bacteriological examination.

After discharge, medical monitoring is mandatory for 3 months.

II. Measures for contact persons. A medical worker who detected a plague patient or a patient with suspected plague, without leaving the premises (before the arrival of the evacuation team) where the patient was detected, by telephone or through a person who was not in contact with the patient, informs the chief physician

of the institution and the chief physician of the relevant Sanitary and Epidemiological Station about the detected patient. Medical personnel and other persons who have been in direct contact with the patients are isolated in a hospital for 6 days. For the purpose of early detection of patients, contact persons are closely monitored with twice-daily thermometry. For emergency prophylaxis, one of the following antibiotics is used: vibromycin 1 capsule per day, doxycycline 0.1 g twice daily, streptomycin 0.5 g twice daily intramuscularly. After the patient is hospitalised, final disinfection is carried out in the area.

III. Measures against the focal point. Disinfection in plague foci is carried out by disinfection teams.

YELLOW FEVER (Febris flava) (synonyms: Yellow fever - English; Gelbfieber - German; Fievre jaune - French; Fiebre amarilla, Vomito negro - Spanish) is an acute arboviral disease transmitted by mosquitoes, characterised by fever, severe intoxication, thrombo-haemorrhagic syndrome, kidney and liver damage.

Etiology. The causative agent is Viscerophilus tropicus virus, belongs to the family Togoviridae, genus Flavivirus, contains RNA, is an arbovirus of antigenic group B. It has antigenic similarity to Japanese encephalitis, dengue and St Louis encephalitis viruses.

Epidemiology. Yellow fever is a quarantine disease. The endemic foci are large areas of South America (Bolivia, Brazil, Colombia, Ecuador, Peru, etc.) and equatorial Africa. The source and reservoir of infection are wild animals (monkeys, opossums, rarely other species), as well as sick people. The carriers are mosquitoes. There are 2 types of yellow fever: 1) urban (anthropogenic) and 2) rural (jungle yellow fever). In the anthropogenic type, infection by a mosquito (Aedes aegypti) occurs during a bite of a sick person at the end of the incubation period or in the first 3 days of the disease. In the rural type of yellow fever, the source of infection is monkeys, and the mosquito vector is Aedes aficanus, Aedes simpsoni.

Pathogenesis. The virus enters the human body when bitten by an infected mosquito. There are cases of laboratory infections by aerogenous means. From the site of invasion, the pathogen spreads through the lymphatic system and reaches

regional lymph nodes, where it multiplies and accumulates. A few days later, the virus enters the bloodstream, where it can be found for 3-5 days. By haematogenous route, the virus penetrates various organs (liver, spleen, kidneys, bone marrow, lymph nodes), causing damage to them. Thrombo-haemorrhagic syndrome develops, which manifests itself in the form of multiple haemorrhages in various organs. The liver is enlarged, necrotic liver cells are located in small foci. These focal homogeneous eosinophilic bodies found in the perisinusoidal spaces of the liver are called Crownsilver bodies. Fatty degeneration of hepatocytes is noted in the central areas of the liver lobules. Liver damage leads to severe jaundice. Changes are detected in the kidneys (edema, haemorrhage, necrosis of the renal tubules), spleen, myocardium, and lymph nodes. After the disease, the patient develops a strong immunity that lasts for 6-8 years.

Symptoms and course. The incubation period ranges from 3 to 6 days. There are 3 periods in the clinical course of yellow fever:

- initial febrile period (hyperaemia stage);
- a period of remission;
- reactive period (stasis stage).

In severe forms of the disease, there may be no remission period.

The disease begins suddenly with a severe headache, severe pain in the lower back, back, and extremities. By the end of the 1st day, the body temperature reaches 39-40 °C and above. There is hyperaemia and puffiness of the face, swelling of the eyelids, injection of scleral and conjunctival vessels. The pulse rate increases to 100-130 per 1 min. On the 2nd day, the patient's condition worsens, painful thirst, nausea, repeated vomiting of mucus and then bile join the symptoms described above. The oral mucosa is hyperemic, the tongue is dry, and the edges of the tongue are reddened. By the end of the first period (3-4th day of illness), cyanosis, jaundice, and minor blood impurities in the vomit may appear. On the 4th-5th day of the disease, the patient's health improves, the body temperature decreases to subfebrile (remission stage). However, after a few hours, the temperature rises again, the patient's condition progressively worsens - the reactive period begins. A thrombohemorrhagic syndrome develops in the form of bloody vomiting, bleeding from the nose, intestines, uterus,

petechiae and large haemorrhages appear on the skin. The patient's face becomes pale. The pulse is rare (up to 50-40 beats per minute), does not correspond to fever (Faget's symptom), blood pressure decreases, the amount of urine decreases, and sometimes anuria develops. The urine contains a large amount of protein, cylinders. Weakness increases, delirium appears. In severe cases, death occurs from renal failure or infectious collapse (infectious toxic shock). With a positive result, the patient's condition gradually improves from day 7-9. In mild cases, the symptoms of the disease are mild, jaundice and thrombohemorrhagic syndrome may not occur. In the presence of very severe forms, patients may die on the 2-3rd day of the disease even before the development of jaundice (lightning forms).

Complications - pneumonia, myocarditis, gangrene of soft tissues or extremities, sepsis as a result of the layering of secondary bacterial microflora.

Diagnosis and differential diagnosis. Recognition of yellow fever is based on epidemiological prerequisites (stay in an endemic area, incidence of yellow fever, etc.) and clinical data. Laboratory tests of diagnostic value include leukaemia, neutropenia, detection of protein and cylinders in the urine, as well as an increase in serum bilirubin, residual nitrogen and a significant increase in serum aminotransferase activity. Characteristic changes are detected in histological examination of liver biopsies. Serological methods used are the PCR, the neutralisation reaction and the RGGA, but the latter often gives positive reactions with other viruses. The test is performed with paired sera.

Currently, virus isolation from blood is used by inoculating material into mosquito cell culture or by injecting material into the thoracic cavity of mosquitoes. The likelihood of virus isolation is higher if the material is taken in the first 3 days of the disease. Serological methods include the plaque suppression reaction with paired sera and the detection of IgM antibodies to yellow fever virus and virus antigens by enzyme-linked immunosorbent assay. The latter method allows confirming the diagnosis within 3 hours.

It is necessary to differentiate yellow fever from dengue, pappatachi fever, leptospirosis, other haemorrhagic fevers and viral hepatitis.

WEST NILE FEVER is an acute infectious disease of viral etiology with polyadenitis, skin rash, and sometimes symptoms of serous meningoencephalitis.

Etiology and Epidemiology. The West Nile virus belongs to the genus flaviviruses, and its antigenic structure is similar to the Japanese encephalitis virus, dengue.

In Egypt, Israel and France, the incidence has a pronounced summer-autumn seasonality. Depending on climatic differences, cases are recorded from May-June to August-September. In tropical areas, the seasonality factor is less important in the epidemiology of this disease.

West Nile virus is transmitted by mosquitoes. Birds, representatives of the aquatic and near-water ecological complex serve as a reservoir of the virus.

Pathogenesis. The virus enters the bloodstream through the skin when a mosquito bites. This is followed by haematogenous dissemination of the pathogen with virulence, with systemic lymphatic tissue damage, manifested by the development of lymphadenopathy. In some cases, the virus penetrates the blood-brain barrier and infects the meninges and brain matter.

Clinic. The incubation period lasts 2-8 days. The disease begins acutely, without prodrome. High fever, generalised weakness, chills, and pain in the eyeballs are manifested. The duration of the temperature period ranges from 3 to 12 days, and the temperature decreases according to the type of accelerated lysis. In some patients, there is a repeated increase in temperature. In some cases, the disease occurs only with the listed general infectious symptoms and is difficult to differentiate from various commonplace, including respiratory, diseases. The similarity with the latter is enhanced by scleritis, conjunctivitis, bright hyperaemia of the pharyngeal rims, and sometimes minor catarrhal phenomena (cough, sore throat). However, the disease can also occur in other clinical forms with nausea, vomiting, abdominal pain, loose stools, enlarged liver and spleen. K.Marberg et al. (1956) noted the following frequency of symptoms: conjunctivitis - 60%; hyperaemia of the posterior pharyngeal wall and rhinos - 40%; splenic enlargement - 20%; liver enlargement - 10%; nausea - 25%; vomiting - 10%; abdominal pain - 20%; loose stools - 30%.

Typical symptoms of West Nile fever also include skin rashes and polyadenitis. The rash has a diverse character - rosacea-like, polymorphic-spotted, scarlet fever-like, etc. It appears on the 2-4th day of the disease, mainly on the upper half of the body and disappears in a few days, leaving no pigmentation. In some outbreaks, the rash occurs in 50% of patients. Polyadenitis is one of the most common symptoms of the disease and is manifested by an increase in all groups of lymph nodes, including the cervical and occipital. Sometimes they reach the size of a walnut and are painful to palpate. Polyadenitis is observed for a long time - from 2 weeks to 1 - 1 ½ months. Some patients have serous meningitis or meningoencephalitis. The development of serous meningitis or meningoencephalitis is accompanied by a sharp headache, vomiting, hyperesthesia, and lethargy. Meningeal symptoms may be very mild or even absent.

In meningoencephalitis, these symptoms are accompanied by signs of focal nervous system damage (anisoreflexia, pyramidal and extrapyramidal signs, horizontal nystagmus), which are subject to rapid reversal during the period of recuperation. Severe forms of encephalitis with paresis, paralysis and death are rarely observed. In surviving patients, paresis and paralysis reverse. Changes in peripheral blood are quite variable, with leukaemia with a left shift in the formula being more common.

The cerebrospinal fluid in serous meningitis and meningoencephalitis is clear, flows under increased pressure and contains an increased number of cells, mainly lymphocytes. The protein content is normal or slightly reduced. The cerebrospinal fluid returns to normal within 2-3 weeks.

Diagnosis and differential diagnosis. The combination of fever, polyadenitis, and skin exanthem is of the greatest diagnostic value. The question of the presence or absence of an inflammatory process in the meninges can only be resolved by examining the cerebrospinal fluid. Indications for a spinal tap are intense headache and repeated vomiting even in the absence of meningeal symptoms.

The methods of virological and serological examination of patients with West Nile fever are similar to those used for the specific laboratory diagnosis of Japanese encephalitis (infection of newborn white mice, RGGA, RBC, neutralisation reaction).

The differential diagnosis is made with enterovirus diseases, leptospirosis, and the classic form of dengue fever. The latter is the most difficult to differentiate from West Nile fever. The diagnosis is facilitated by the occurrence of serous meningitis and meningoencephalitis, which are not characteristic of dengue fever.

Treatment is symptomatic. Diuretics and dehydrating agents (diacarb, furosemide or lasix) are prescribed for symptoms of nervous system damage. Relief from severe headache and vomiting is provided by spinal puncture due to reduction of intracranial pressure.

The prognosis is favourable. The exception is the rare cases of severe meningoencephalitis, which are similar to Japanese encephalitis and St Louis encephalitis and usually occur in elderly people with a low immune response.

Prevention. There is no specific vaccine or seroprophylaxis for West Nile fever. Protection against mosquito bites is recommended.

Recommended literature

Basic

1. Infectious diseases / edited by O. A. Holubovska. 3rd edition, revised and supplemented - K.: VSV "Medicine", 2020. - 686 p.
2. Infectious and parasitic diseases in pregnant women and women in labour / edited by Malyi V.P., Kopcha V.S. - Lviv - Publisher Marchenko T.V., 2024 - T 1 - p.336.
3. Infectious and parasitic diseases in pregnant women and women in labour / edited by Malyi V.P., Kopcha V.S. - Lviv - Publisher Marchenko T.V., 2024 - T 2 - p.331.
4. Infectious and parasitic diseases in pregnant women and women in labour / edited by Malyi V.P., Kopcha V.S. - Lviv - Publisher Marchenko T.V., 2024 - T 3 - p.280.
5. Immunoprophylaxis of infectious diseases: a textbook / L.I. Chernysheva, F.I. Lapiy, A.P. Volokha et al. 3rd edition, revised and supplemented - K.: VSV "Medicine", 2022. 334 p.
6. Socially significant and especially dangerous infectious diseases / Yurko K.V., Solomennyk H.O. - K.: VSV "Medicine", 2023. 255 p.

Additionally

1. Infectious Diseases: Textbook: in 2 volumes / edited by V.P. Malyi, M.A. Andreychyn. - Lviv: Magnolia 2006, 2018. - Vol. 1. - 652 p.
2. Infectious Diseases: Textbook: in 2 volumes / edited by V.P. Malyi, M.A. Andreychyn. - Lviv: Magnolia 2006, 2018. - Vol. 2. - 726 p.
3. Vinohrad N.O. Special epidemiology: a textbook for students of higher medical schools, institutes and academies / N.O. Vinohrad, Z.P. Vasylyshyn, L.P. Kozak - 2nd edition, revised and supplemented - Kyiv: Medicine, 2018. 368 p.